

PISA 2022: MAIN RESULTS OF UKRAINIAN STUDENTS' CREATIVE THINKING ASSESSMENT

How creative are
Ukrainian 15-year-
olds?



A BRIEF OVERVIEW OF 15-YEAR-OLDS' CREATIVE THINKING PERFORMANCE IN UKRAINE



- 
- In the PISA 2022 Creative Thinking assessment, Ukraine scored an average of **27 score points**, ranking between **32nd and 42nd positions among 64 countries and economies** participating in the creative thinking assessment. Ukraine's average score of 27 points is significantly lower than the OECD average (33 score points).
 - In Ukraine, **59%** of students reached a **baseline level** of creative thinking proficiency (**Level 3**) or higher. Additionally, every fourth 15-year-old teenager performed at Level 3. In creative thinking, students who performed at Level 3 demonstrated the ability to generate appropriate ideas for simple to moderately complex expressive and problem-solving tasks. On average, across OECD countries, around 79% of students reached Level 3 or higher.
 - In Ukraine, **13% of students** reached **the highest levels, Level 5 or 6**. At these levels, students demonstrate the capacity to generate, evaluate and improve creative ideas in diverse and complex tasks, including tasks on creating an abstract design or more constrained/unfamiliar scientific and social problem-solving scenarios. On average, over one in four students across OECD countries reaches such levels.
 - **18% of students** in Ukraine performed at the lowest level in creative thinking (**Level 1 or below**). In their responses, teenagers performing at this level can create very simple visual designs based on common ideas. In OECD countries, only around 8% of students performed at this lowest level.
 - In Ukraine, most students scored lower than expected in creative thinking, considering their performance in mathematics and other PISA domains.
 - In Ukraine, girls scored 2 points more in creative thinking than boys on average. Although this gap is significant, it is the smallest among the reference countries and smaller than the OECD average (3 score points). In general, in no country/economy did boys outperform girls in creative thinking.

- 
- 
- 
- On average, students with **high socio-economic status** performed better in creative thinking than disadvantaged students in both OECD countries and Ukraine. **10.2%** of Ukrainian students **with low socio-economic status** have high results in creative thinking. Among the reference countries, the share of resilient students ranges from 7.4% in Bulgaria to 15% in Estonia.
 - In Ukraine, students from **rural areas lag behind** their peers in cities with a population of more than 100,000 **by 6 score points** in creative thinking, which matches the OECD average. The difference in creative thinking performance between students from urban and rural areas is not solely due to variations in the quality of educational institutions and the services they offer. Instead, it is influenced by such factors as students' socio-economic status and school ESCS index.
 - In Ukraine, students attending **colleges, technical schools, and vocational institutions** scored **5 points** lower than students from secondary schools and educational complexes. Furthermore, the latter group scored slightly lower but still significantly behind students from lyceums, gymnasiums, and specialised schools by almost **2 score points**.
 - In Ukraine, students are likely to agree that creativity is relevant in various spheres of life, not only in art: **67%** of teenagers do not agree that creativity is limited to art, and **86%** believe **it can be expressed in almost any field**. Students who have positive beliefs about the nature of creativity and believe that creativity can be expressed in any field of activity demonstrated higher performance results in creative thinking. However, only **47% of Ukrainian** 15-year-old students think that **one's creativity can be developed**. For another, a larger part of the student body, creativity is an innate talent, an ability that cannot be changed, which is closer to personal traits that cannot be improved by education, training, or experience.

- 
- 
- 
- In Ukraine, principals have positive beliefs about the nature of creativity and its potential for development. Almost all students attend schools the leaders of which agree that there are many different ways to show creativity (98%) or that one can be creative in nearly any field (97%). Principals in Ukraine are the least likely to agree that creativity can be trained: 77% of students attend schools the principals of which adhere to such views.
 - In Ukraine, students report a higher level of perception of **their teachers' practices aimed at developing creativity** (creative pedagogical approaches) compared to the average in OECD countries. For example, **about 80% of teenagers** believe that their **teachers value creative students** and that educational institutions allow them to express various ideas.
 - In Ukraine and in most OECD countries, there is no significant association between **students' participation in creative activities** and their ability to think creatively. However, there are some patterns related to the frequency of participation in these activities at school. Students who engage in visual arts, computer science/programming, and scientific work once or twice a week, on average, tend to perform better compared to those who participate less often (e.g., once a month or once or twice a year) or more often (e.g., every day or almost every day).



UKRAINE IN PISA 2022



Programme for International Student Assessment (PISA): Key Features of the 2022 Cycle

The Program for International Student Assessment (PISA) was initiated by the Organisation for Economic Co-operation and Development in 1997. Its purpose is to evaluate the proficiency of 15-year-old students in reading, mathematics, and science, as well as their acquisition of essential knowledge and skills necessary for full participation in social and economic life.

PISA normally has a three-year cycle. This was the eighth cycle. This cycle's Main Study was supposed to be held in 2021, but due to the COVID-19 pandemic and the long-term closure of educational institutions worldwide, it was postponed by a year.

Ukraine first participated in PISA in 2018 and then again in 2022.

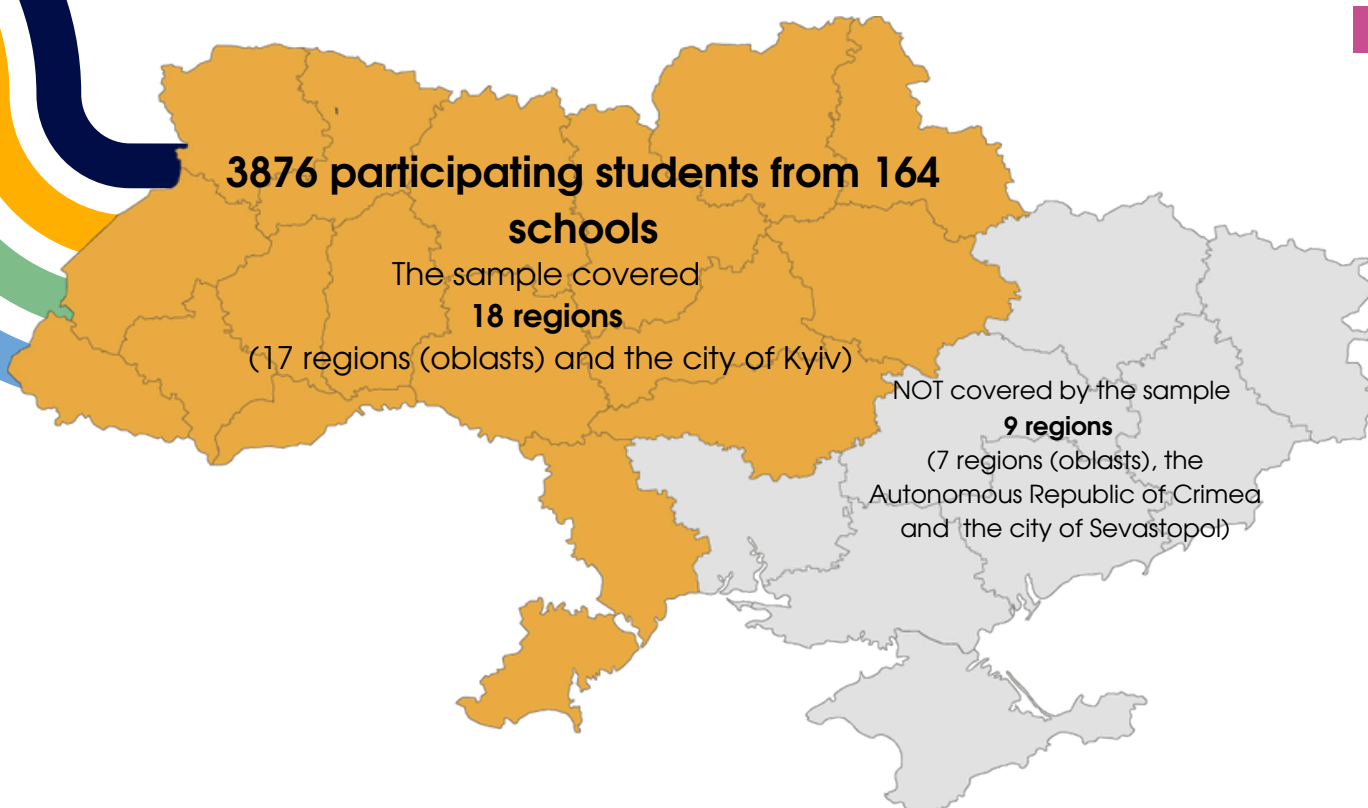
The uniqueness of PISA is revealed in particular in the fact that in addition to the assessment of three key subject domains, namely reading, mathematics and science, this study also focuses on other relevant areas, which, according to experts, are critical for today's young person. The innovative domain of the eighth PISA cycle, the Main Study of which was held in 2022, was **Creative Thinking**.

In schools, PISA testing and survey, including those on creative thinking, were conducted from **October 3 to October 26, 2022**. The sample of PISA 2022 schools, which had been formed before the start of a full-scale war, included **295** institutions where more than **9,000** students could potentially become study participants. This sample was sufficient to represent **328,890** Ukrainian teenagers aged 15.

Unfortunately, the full-scale invasion of the Russian Federation on the territory of Ukraine prevented the realisation of the intentions under the previously defined parameters since, at the time of the survey, some of the selected schools occurred in the territory that was not controlled by the Government of Ukraine or appeared in the combat zone as well as some of them were damaged or destroyed. In addition, the full-scale war forced many Ukrainians, including 15-year-olds, to flee from their homes and move to safer regions of the country or abroad.

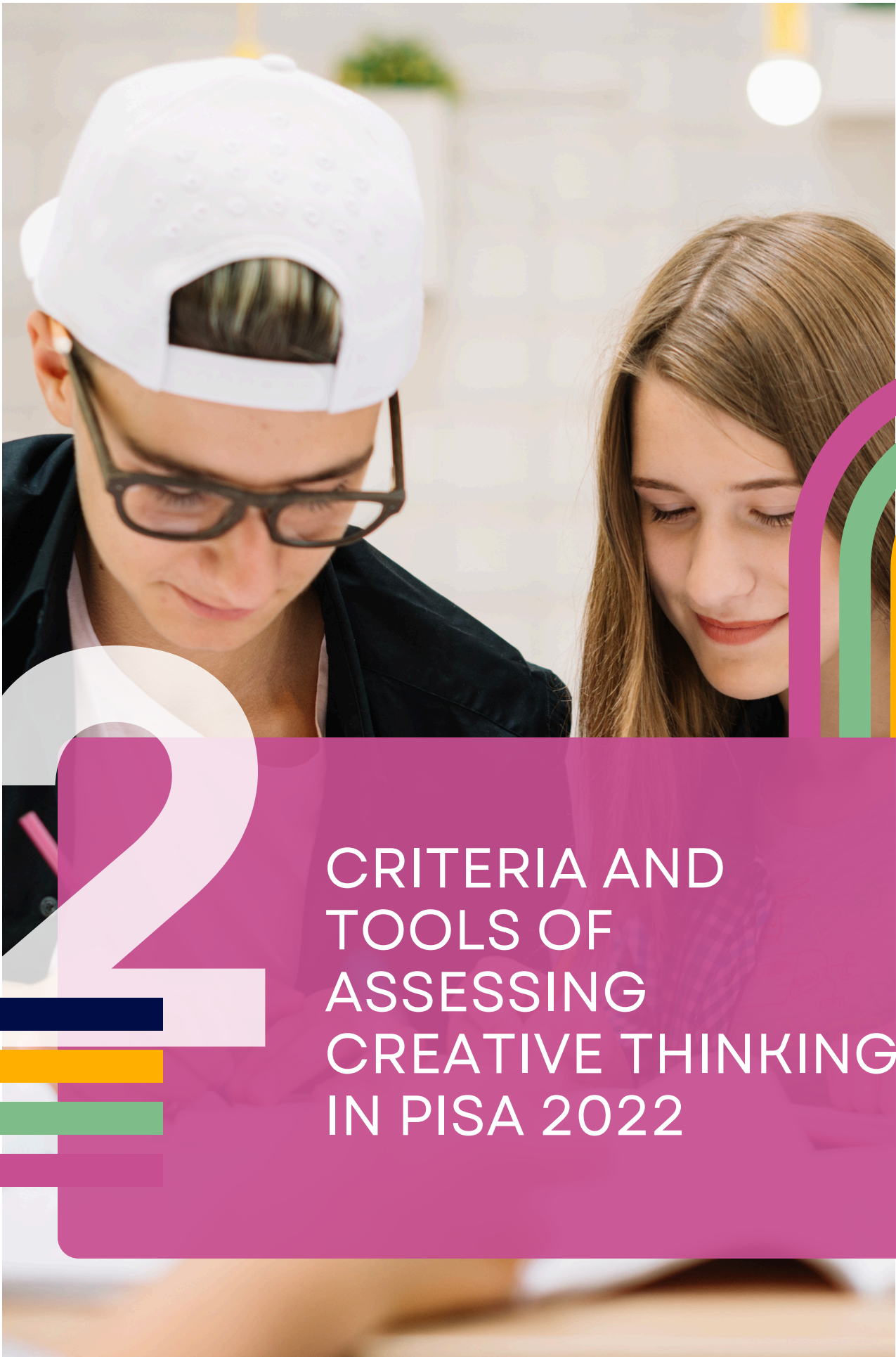
No assessment was conducted in six regions of Ukraine - Donetsk Oblast, Kharkiv Oblast, Luhansk Oblast, Zaporizhzhia Oblast, Kherson Oblast, Mykolaiv Oblast, and in the Autonomous Republic of Crimea and the city of Sevastopol. Three schools could participate in the survey in Dnipro Oblast but their results were not included in the analysis due to the lack of representativeness. The data presented in this report, as well as in the national and international reports on the results of PISA 2022, refer only to the results of 17 regions of Ukraine, namely Cherkasy Oblast, Kirovohrad Oblast, Poltava Oblast, Vinnytsia Oblast, Chernihiv Oblast, Kyiv Oblast, Sumy Oblast, Zhytomyr Oblast, Odesa Oblast, Chernivtsi Oblast, Ivano-Frankivsk Oblast, Khmelnytsk Oblast, Lviv Oblast, Rivne Oblast, Ternopil Oblast, Volyn Oblast, and Zakarpattia Oblast, as well as the city of Kyiv.

The study sample was formed without considering students from the temporarily occupied territories of the Autonomous Republic of Crimea, the city of Sevastopol, and certain districts of the Donetsk and Luhansk Oblasts. In addition, due to the impossibility of creating safe conditions for participation in the study, 1,500 students who lived in settlements near the Joint Forces Operation area and the demarcation line were excluded from the general population. Also, to reduce financial costs and simplify the administration process, schools providing learning in the languages of indigenous peoples or national minorities (except Russian) or foreign languages, as well as students with special educational needs, were excluded from the sample. Due to these reasons, some students could not participate in the survey. Ultimately, the share of excluded schools where 15-year-olds were enrolled equalled 1.47%.



The final sample of participants in the Main Study of PISA 2022 in Ukraine was **3,867** students from **164** schools in **18** regions of Ukraine.

According to reporting standards, in the International Report on the PISA 2022 results, the data for our country are marked as "Ukrainian Regions (18 of 27)". In the national report, to simplify the presentation of information, we use the designation "Ukraine", which, however, should be understood as the 18 regions included in the 2022 Study.



2

CRITERIA AND
TOOLS OF
ASSESSING
CREATIVE THINKING
IN PISA 2022

Criteria and Tools of Assessing Creative Thinking in PISA 2022

PISA 2022 defines creative thinking as

“the competence to engage productively in the generation, evaluation and improvement of ideas that can result in original and effective solutions, advances in knowledge and impactful expressions of imagination”.

The PISA definition focuses on the cognitive processes required to engage in creative work and is aligned with the concept of “little-c” creativity – in other words, a malleable capacity that can be developed through practice and that can be reasonably demonstrated in everyday contexts.

This definition of creative thinking encompasses both divergent cognitive processes (the ability to produce a variety of ideas and creative concepts) and convergent cognitive processes (the ability to assess ideas and suggest improvements). In PISA 2022, creative thinking was measured through three specific ideation processes (Fig. 1).

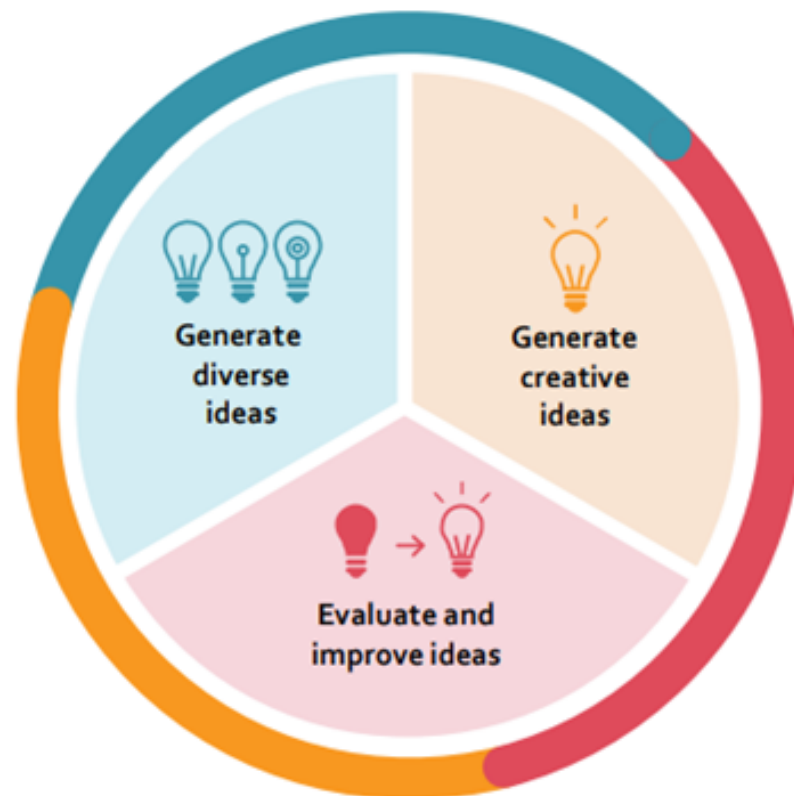


Figure 1. The construct of creative thinking and its measurement in PISA 2022

The construct described above was reflected in a valid assessment tool - a system of tasks that students worked with while participating in the creative thinking test within the PISA 2022 framework.

PISA 2022 Creative Thinking test was represented by the tasks within four different domain contexts:

written expression that involves communicating ideas and imagination through written language;

visual expression that involves communicating ideas and imagination through a range of different media;

social problem solving that involves understanding different perspectives, addressing the needs of others, and finding innovative and functional solutions for the parties involved

scientific problem solving that involves generating new ideas, designing experiments to probe hypotheses, and developing new methods or inventions to solve problems.



Sample items to assess creative thinking in PISA 2022

Written Expression

Creative writing is the expression of ideas and imagination through written speech. In the PISA 2022 Creative Thinking test, students were asked to express their imagination in various written formats. For example, students captioned an image, proposed ideas for a short story, or wrote short dialogues between characters in a movie or comic book.

Sample Unit for written expression: Illustration Titles. Item 2 (Generate diverse ideas)

Students were asked to come up with original and diverse titles, respectively, for abstract illustrations. To get full credit on the item, the ideas must all be appropriate and sufficiently different from one another.

Illustration Titles
Question 2 / 2

Refer to the illustration on the right. Type your answers to the question in the text boxes below.

Write 3 different titles for the illustration on the right. The titles should be as different from each other as possible.

Title 1

Title 2

Title 3

Figure 2. Illustration Titles: Item 2

Visual Expression

Visual expression is transferring ideas and imagination through various means of information (media). In the PISA creative thinking test, students created visual compositions (logos, event posters or product designs) using a library of images and shapes by means of a simple graphic tool. They could change the size, rotate and change the colour of shape elements.

Sample Unit for visual expression: Science Fair Poster: Item 1 (Generate creative ideas)

In the unit Science Fair Poster, students designed and improved posters for their school's upcoming science fair. The theme of the science fair for which the participants had to create their original posters was "Life in Deep Space". Students used a simple drawing tool that includes different shapes, colours and stamps. To get full credit, students must create a poster with an original theme.



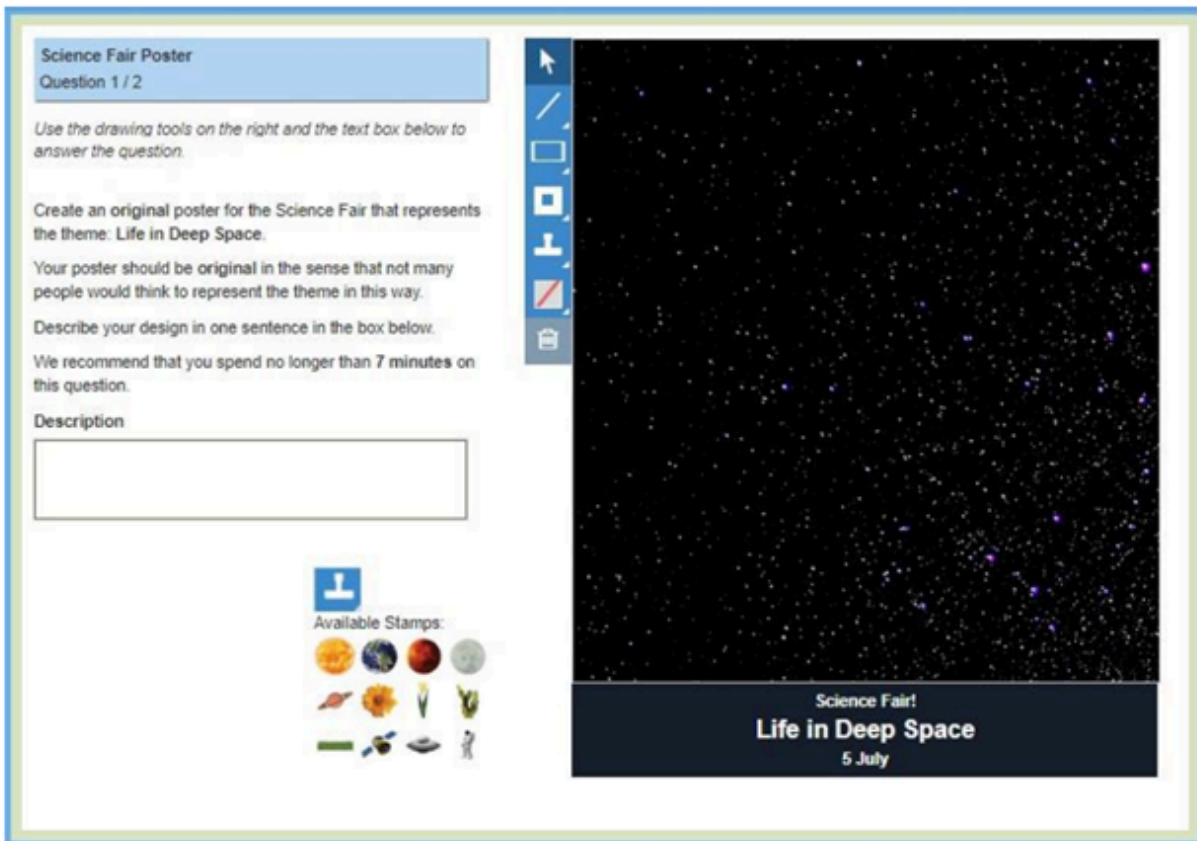


Figure 3. Science Fair Poster: Item 1

Social Problem Solving

Social problem solving can range from the small-scale, personal and interpersonal problems of individuals to widespread, community or even global problems. In the PISA creative thinking test, students suggested solutions for open problems that focused on issues affecting different groups within society (e.g. wheelchair users) or affecting society at large (e.g. the collection and use of waste materials).

Sample Unit for social problem solving: Library Accessibility: Item 1 (Generate diverse ideas)


Students were asked to think of three different ideas for improving accessibility of a library for the wheelchair users. To get full credit, students had to provide three appropriate ideas that are sufficiently different. If students provided only two different ideas, then their response received partial credit.

Library Accessibility
Question 1 / 2

Type your answers to the question in the boxes below.

Describe 3 different ideas for how to improve the wheelchair accessibility of the library. The ideas should be as different from each other as possible. Be specific in your descriptions.

We recommend that you spend no longer than 5 minutes on this question.



Idea 1

Idea 2

Idea 3

Figure 4. Library Accessibility: Item 1

Library Accessibility: Item 2 (Evaluate and improve ideas)

In the second item of the unit Library Accessibility, students were presented with an idea to install ramps in the library. They were asked to suggest an original modification or feature for the ramp that would further enhance the ability of wheelchair users to access books in the library. To get full credit, in their responses, students were to present an original improvement idea. Responses corresponding to conventional themes were awarded partial credit unless combined with an innovative approach or implementation.



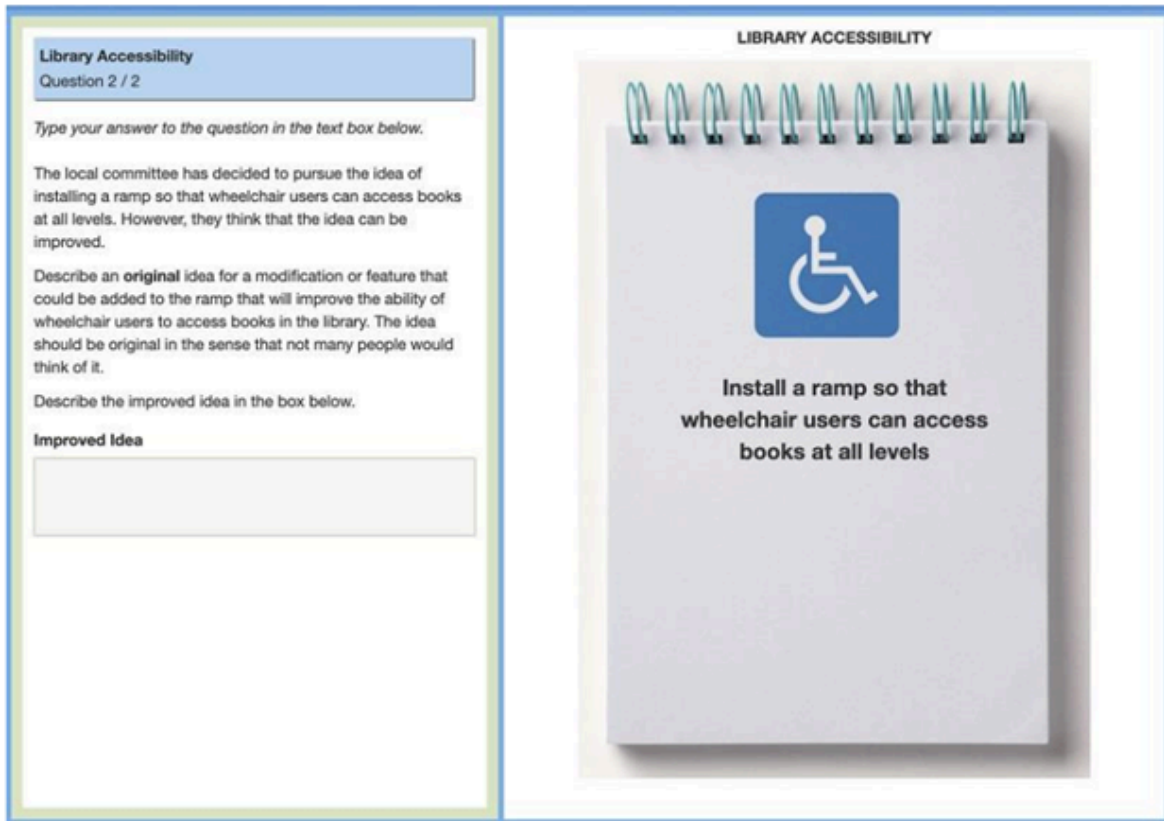


Figure 5. Library Accessibility: Item 2

Scientific Problem Solving

In the PISA creative thinking test, students investigated open-ended scientific or engineering problems. Although creative thinking in scientific contexts is related to scientific inquiry, the tasks in this domain context differed fundamentally from the PISA scientific literacy tasks. In the creative thinking test, students were asked to generate multiple ideas or solutions, or an original idea or solution, for an open-ended problem with no pre-defined “correct” response.

Sample Unit for scientific problem solving: Save the River: Item 1 (Generate diverse ideas)

The first item in the Save the River unit (Generate diverse ideas) describes the problem to students (a declining frog population in a part of the river downstream from the city) and asks them to provide two different, testable ideas for possible causes. Students were explicitly instructed to think of causes other than pollution. Students could only get full credit or no credit for this item, as only two different ideas were required.

Save the River
Question 1 / 2


Refer to the information below. Type your answers to the question in the boxes on the right.

A lab team investigating the problem has collected frogs in two places along the river. Where the river flows out of the city, there are fewer frogs than usual.

Their main hypothesis so far is that pollution from the factories and farms in the surrounding area is causing the problem with the frogs. However, the lead scientist thinks there may be other reasons for the problem that are unrelated to pollution.

Describe **2 different ideas** that might explain why there are fewer frogs where the river flows out of the city. Your ideas should be scientifically valid (can be tested using scientific methods) and as different from each other as possible.

We recommend that you spend no longer than **5 minutes** on this question.



Idea 1

Idea 2

Figure 6. Save the River: Item 1

Save the River: Item 2 (Evaluate and improve ideas)

The second item of the Save the River unit asks students to improve a proposed experiment aiming to test whether pollution is the cause of the problem with the declining frog population. To get full credit, the response must be original. Responses that corresponded to conventional themes were awarded partial credit, unless combined with an innovative approach or implementation.

Save the River
Question 2 / 2

Refer to the information on the right. Type your answer to the question in the box below.

The lab team has decided to conduct an experiment to test whether pollution from the factories is the cause of the problem with the frogs. Their proposed experiment is shown on the right.

Think of a way to improve the experiment that is **original** in the sense that not many people would think of it. Your idea should help the team to gain more conclusive evidence in order to know if chemical pollution is the cause of the problem with the frogs.

Describe your improved experiment idea in the box below.

Improved Experiment Idea

SAVE THE RIVER

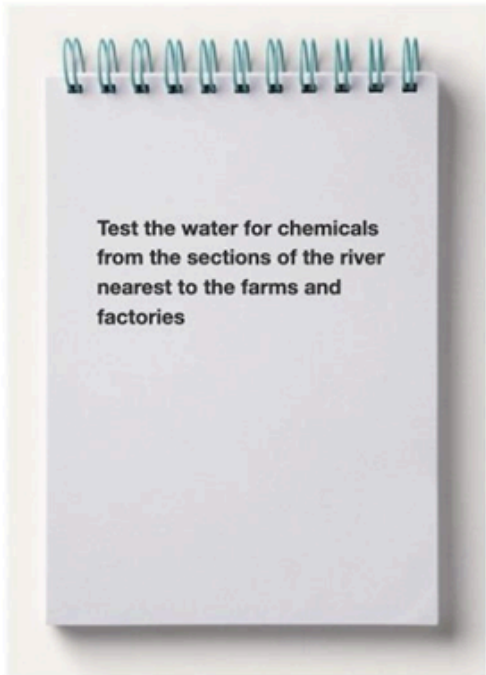


Figure 7. Save the River: Item 2



THE 15-YEAR-OLD
STUDENTS'
PERFORMANCE IN
CREATIVE THINKING



The 15-Year-Old Students' Performance in Creative Thinking

The results of assessing the creative thinking of Ukrainian 15-year-old students are compared to those of students from other countries/economies participating in the creative thinking assessment, including reference countries.

In the PISA 2022 Creative Thinking assessment, Ukraine scored an average result of **27 points** and ranked between **32 and 42 among 64 countries/economies** where creative thinking was evaluated. Ukraine's mean performance is **6 score points lower than the OECD average** (Fig. 8). This result does not statistically differ from the average performance of such six countries as Qatar, Costa Rica, Greece, Romania, Colombia and Jamaica, among which Colombia is the OECD country with the lowest result (26 points).

The reference countries are those of which education system characteristics and student performance results are compared with parameters similar to those of Ukraine. These countries were selected based on similarities in socio-economic status and cultural or historical affinity with Ukraine. The reference countries for Ukraine include Bulgaria, Estonia, Moldova, Poland, and the Slovak Republic.

Additionally, Greece was included as a reference country to compare Ukraine's results in creative thinking. As an OECD country, Greece has similar results to Ukraine in creative thinking but shows higher results in reading and lower results in mathematics and natural sciences."

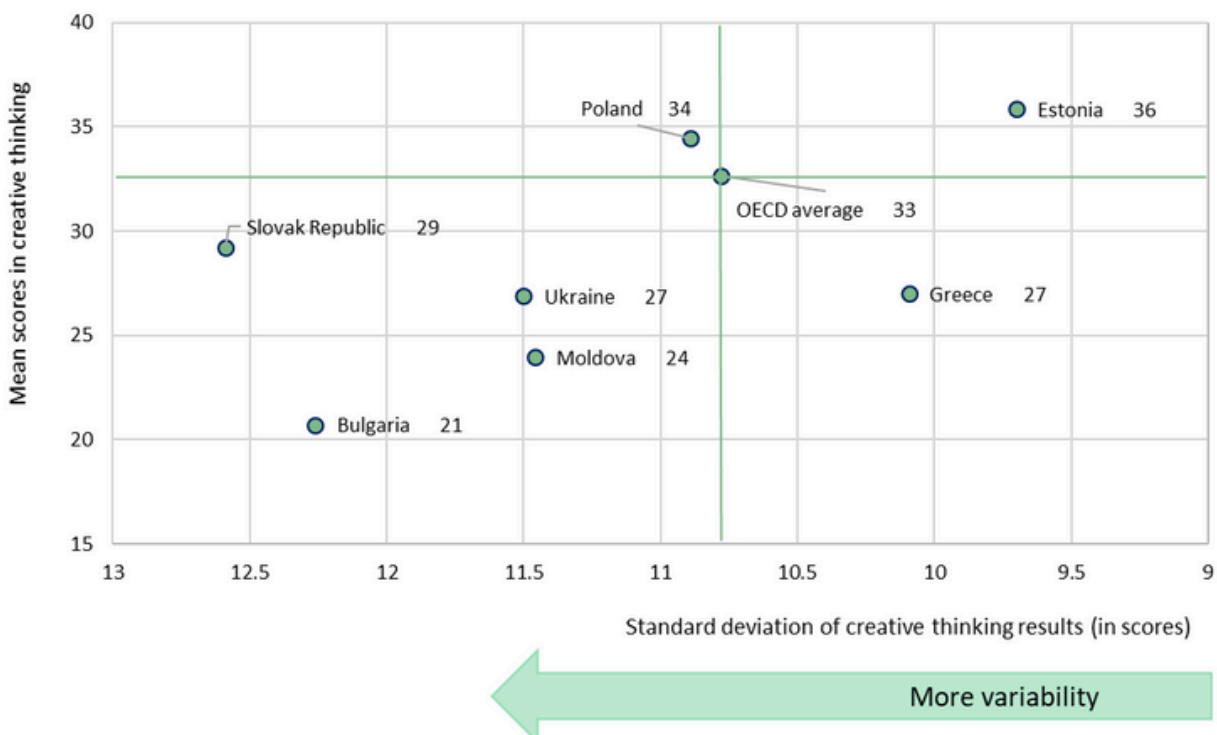
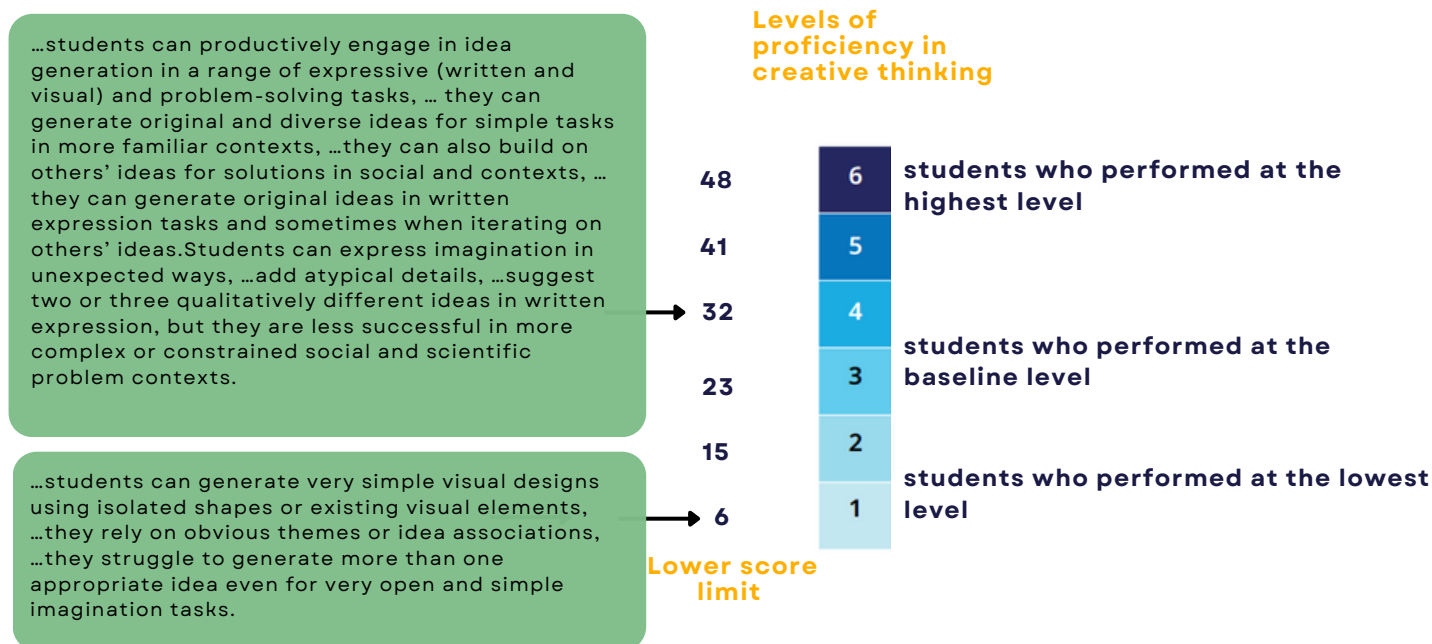


Figure 8. Average performance in creative thinking and variation in performance across reference countries

At the stage of processing and analysing the data obtained as a result of the students' performance in the creative thinking test, a one-dimensional scale was used to assess the participants' general level of proficiency in creative thinking. This scale was constructed as a limited scale ranging from 0 to 60 points.

The maximum score of 60 points is the total number of points that can be scored as a result of a hypothetical test containing all items from the set of tasks of the creative thinking test (32 tasks). Therefore, the scores for this test can be interpreted as the approximate number of correct answers (partially or fully credited) given by a student if they had passed the entire test.

WHAT DO THE PISA SCORES ON A SCALE OF 0 TO 60 SAY?



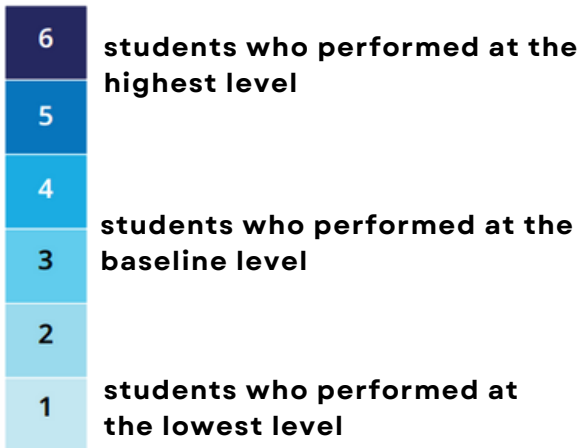
In Ukraine, **59% of students** achieved baseline Level 3 and higher, and 1 in 4 of 15-year-old students performed at Level 3. Among the reference countries, the largest number of students who achieved the baseline level is in Estonia (89%), and the least is in Bulgaria (39%). In Bulgaria, every 10th student did not achieve the minimum level (Level 1) in creative thinking; in Ukraine, only no more than 1% did so (Fig. 9).

On average, more than one in four 15-year-olds in OECD countries and one in three in Estonia and Poland are top-performers in creative thinking. In Ukraine, only 13% of students scored at the highest levels. On average, across the OECD countries, and in Estonia and Poland as the reference countries, almost every tenth student achieved the highest level in creative thinking (Level 6). The smallest number of such students is in Greece (1%). Unfortunately, the indicator is also relatively low in Ukraine - only 3% (Fig. 9).

To help interpret what student scores mean on the PISA creative thinking scale in substantive terms, the scale is divided into seven proficiency levels. Six levels are described based on the skills needed to successfully complete the tasks that are located within them; the seventh level refers to students who perform below Level 1. Level 1 is the lowest described level and Level 6 corresponds to the highest described level of creative thinking skills. Students with a proficiency score within the range of Level 1 are expected to complete most Level 1 tasks successfully, but are unlikely to be able to complete tasks at higher levels; students with scores in the Level 6 range are likely to be able to successfully complete all tasks included in the PISA 2022 assessment of creative thinking.

CREATIVE THINKING PROFICIENCY LEVELS

Top-performers



A baseline level (Level 3) - at this level, students can generate one or several appropriate ideas for simple to moderately complex expressive and problem-solving tasks, ... typically suggest ideas that rely on obvious idea associations, ... but they begin to demonstrate the ability to generate original solutions for familiar, everyday problems with a social focus, ... they can suggest solution ideas that not many other students think of or add an innovative or different twist to more conventional solution ideas (begin to get full credit).

Students who achieve Level 5 or Level 6 are the most successful. They can demonstrate the capability of generating, evaluating and improving creative ideas for diverse and complex tasks, including more abstract visual designs or more restricted/unfamiliar range of solutions for social and scientific problems.

Low-performers

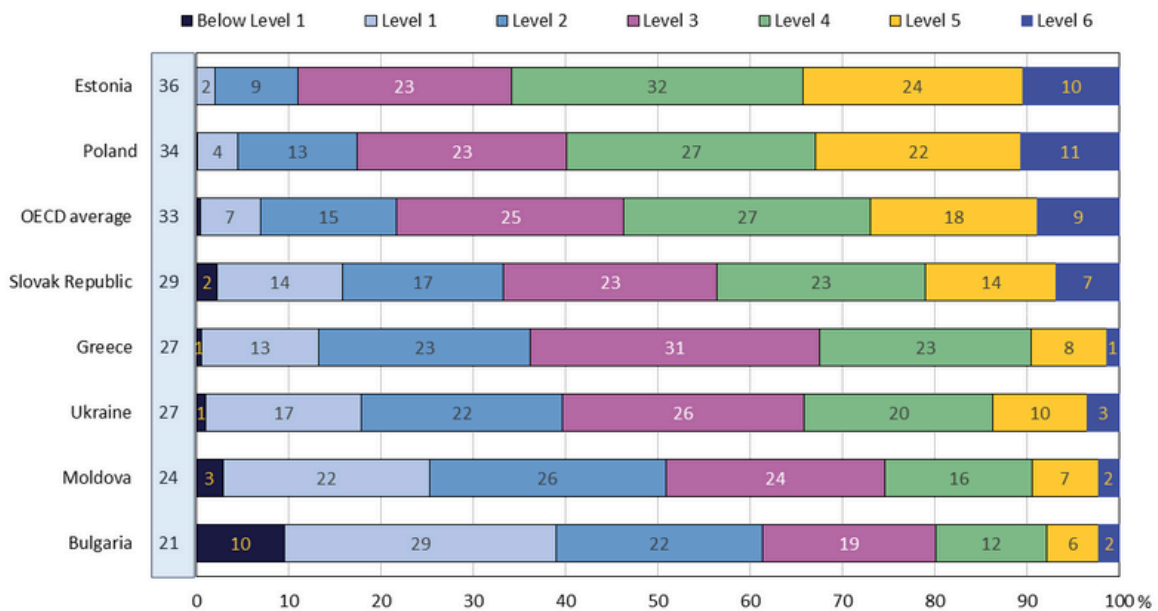


Figure 9. Students' proficiency level in creative thinking, by reference countries and Ukraine, and OECD average

Note: Countries and economies are ranked in descending order of the number of students who achieved a baseline level (Level 3) or higher according to the creative thinking scale. Next to each country's name, its corresponding mean score is provided.

Source: OECD, PISA 2022 Database

On average, across the OECD around 28% of the total variation in creative thinking performance can be unequivocally associated to student performance in mathematics. This means that relatively little of the variation in performance across OECD countries can be accounted for simply by student performance in the mathematics assessment. A smaller proportion of the variation in student performance – around 20% – can be explained by student gender and student and school socio-economic profile (i.e. student background variables), and factors common to both student background and mathematics performance.

Among the reference countries, **Ukraine** has the largest share of variation (**33%**) (Fig. 10) in creative thinking performance, which is related to math performance. This suggests that students with low scores in creative thinking are likely to perform poorly in mathematics as well. Among students who achieved high scores in creative thinking (Levels 5 or 6), only 17% also performed at Levels 5 or 6 in mathematics. In comparison, in Estonia 29% of students performed at these high levels in mathematics.

Correlation in performance among creative thinking, mathematics, reading and science

Given that generating, evaluating, and refining ideas are essential in all educational subjects, it's likely that students' performance in creative thinking is positively correlated with their performance in mathematics, reading, and science even though in the PISA 2022 creative thinking assessment more attention is paid to the ability of students to generate original or qualitatively new ideas. The correlation between creative thinking, on the one hand, and each of the other three PISA domains on the other, is almost identical: 0.67 with mathematics, 0.66 with reading and 0.66 with science. However, in all reference countries, performance scores in the three core domains of PISA are more strongly correlated with each other than with the scores in creative thinking. This may mean that creative thinking assessment measures different skills than those required for mathematics, reading, and science assessment tasks.

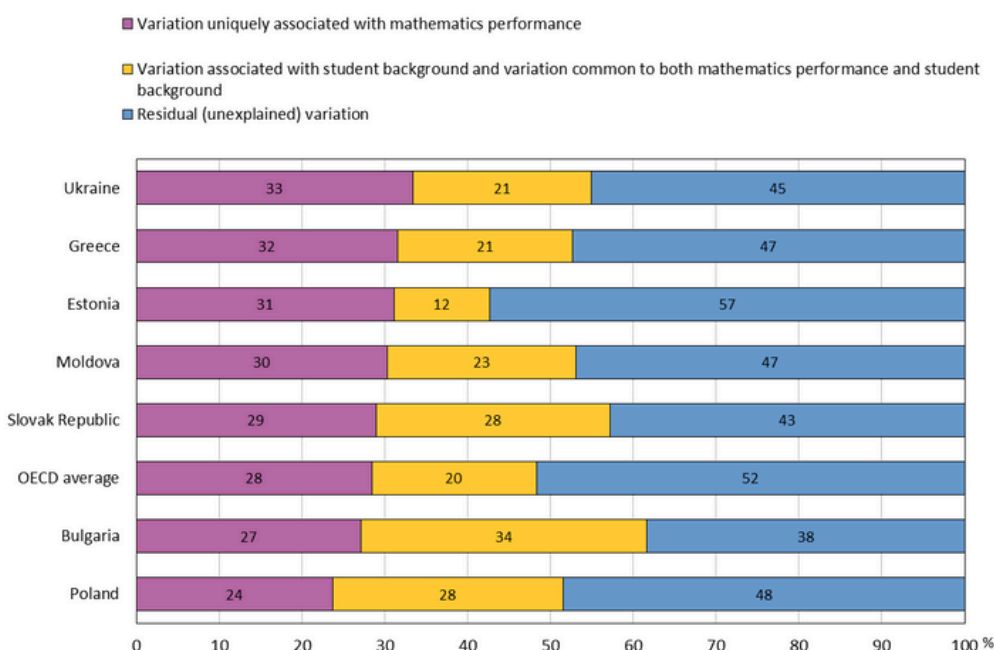


Figure 10. Variation in creative thinking performance associated with performance in mathematics

Source: OECD, PISA 2022 Database



CREATIVE THINKING
PERFORMANCE
DIFFERENCES
RELATED TO SCHOOL
CHARACTERISTICS
AND GENDER

Variation in Creative Thinking Performance between and within Schools

The variation in performance between schools indicates their effectiveness in fostering and nurturing student creativity.

The difference in creative thinking performance between schools accounts for about 26% of the overall variation in creative thinking performance within countries or economies, on average across OECD countries. The remaining 74% of the variation is attributed to differences in student performance within the same schools. This means that, first of all, the characteristics of the students themselves (for example, their educational background, social status of the family, attitude to learning and general behaviour), as well as differences in the diversity of student population between classes within the same school, have a greater influence on the variability of creative thinking performance results.

In Ukraine, this share of variation in creative thinking performance due to the differences between schools is **31%** indicating no significant segregation of students by schools (Fig. 11).

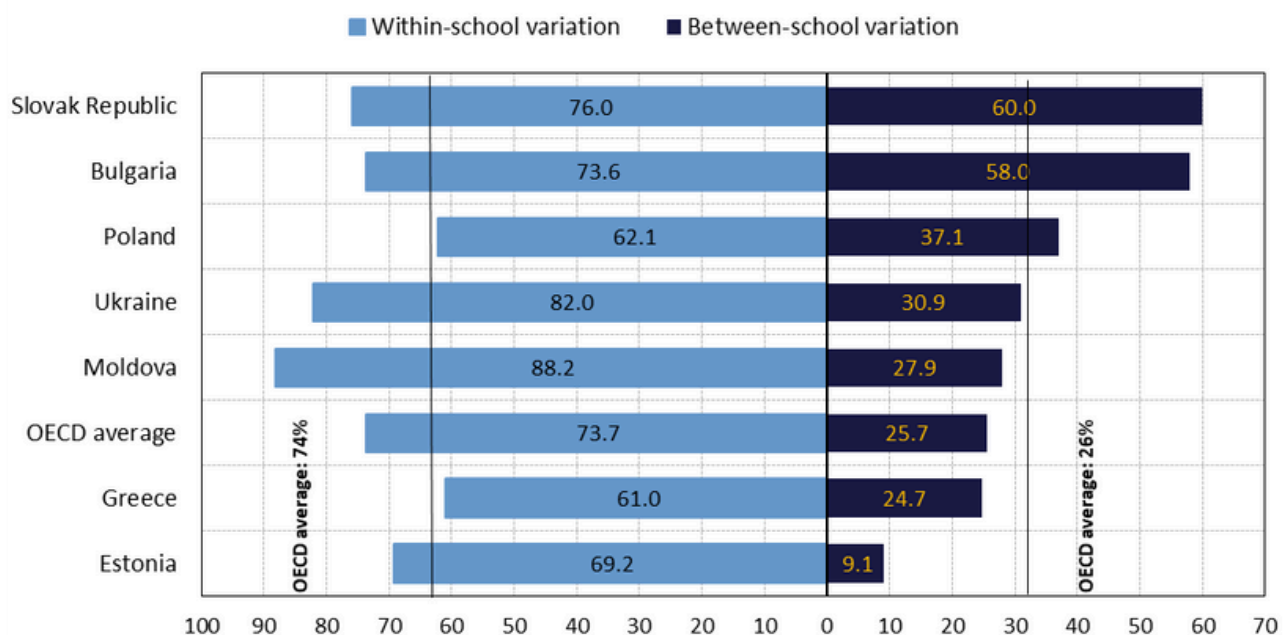


Figure 11. Variation in creative thinking performance between and within schools (by countries and economies, OECD average)

Source: OECD, PISA 2022 Database

Gender-Related Differences in Creative Thinking Performance

According to the analysis results, a clear and significant association between gender and creative thinking performance was revealed. In no participating country/economy did boys outperform girls in creative thinking.

In almost all countries/economies, the difference in average performance between boys and girls is statistically significant in favour of girls. Across OECD countries, on average, girls showed a substantial advantage in creative thinking performance, scoring nearly 3 points higher than boys.

In all reference countries, girls also performed better in creative thinking, with a gap of nearly 3 points. **In Ukraine**, this gap is the smallest, although still significant - **almost 2 score points in favour of girls** (Fig. 12).

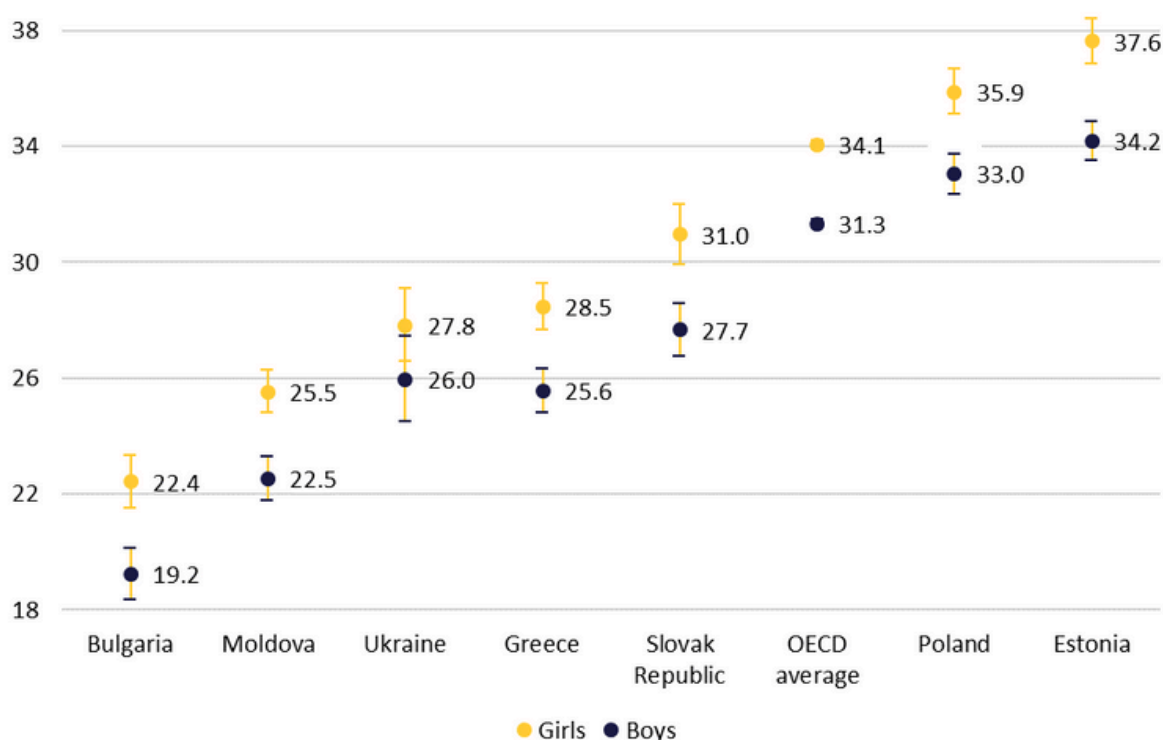


Figure 12. Average creative thinking performance, by gender

Note: The figure shows the mean score for girls and boys and a 95% confidence interval.

Source: OECD, PISA 2022 Database

Performance Differences Related to Students' Socio-Economic Status

In all reference countries, the higher socio-economic status students have, the higher they score in creative thinking assessment. The most significant gap between advantaged students (in the top quarter of the PISA index of socio-economic and cultural status (ESCS) in the respective country) and disadvantaged students (in the bottom quarter of the index in the respective country) is observed in the Slovak Republic and Bulgaria (14 points each), and the smallest in Estonia (6.6 points). **In Ukraine**, the difference between advantaged and disadvantaged students' performance is **11 score points** (Fig. 13).

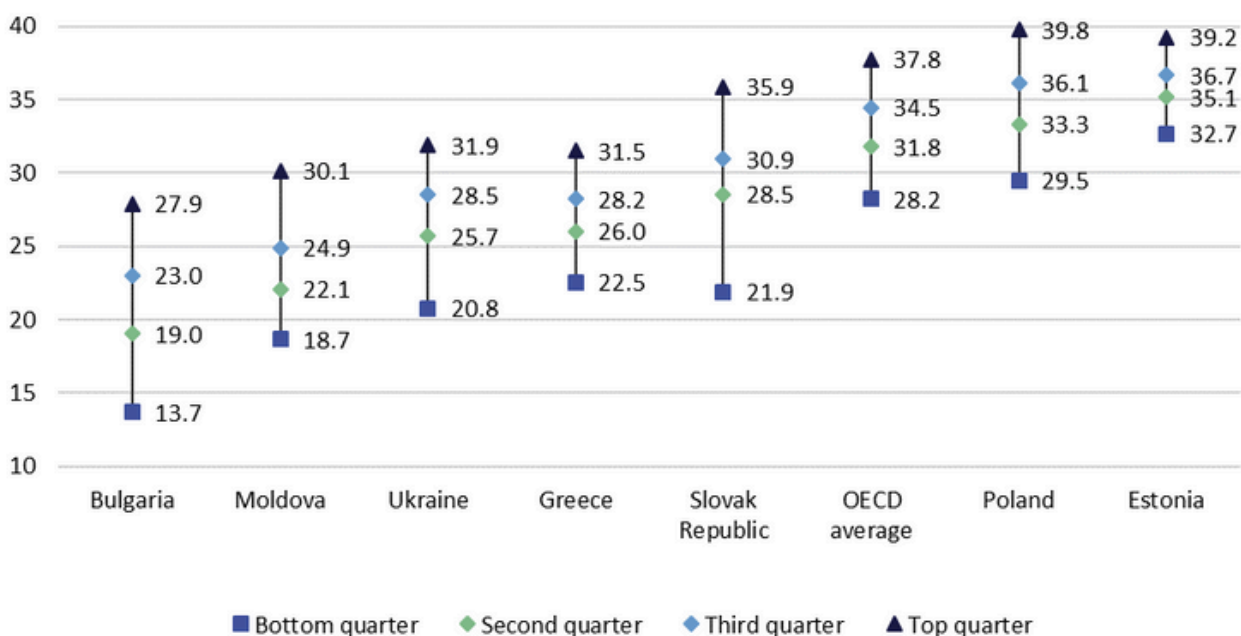


Figure 13: Average scores in creative thinking performance by quartile intervals of the distribution of the index of socio-economic status (ESCS) in reference countries and on average across OECD countries.

Note: Countries are ranked in ascending order of average scores in creative thinking performance.

Source: OECD, PISA 2022 Database

The association between socio-economic status and performance in creative thinking is explained by the fact that students from families with low socio-economic status perform poorer in PISA. At the same time, among socio-economically disadvantaged students, some 15-year-olds achieved high scores in creative thinking; that is, they are resilient students.

The share of academically resilient students in creative thinking varies across countries and economies, from as much as 20% of disadvantaged students in Uzbekistan to below 8% of disadvantaged students in Romania, Bulgaria and Peru. Among the reference countries, the share of resilient students ranges from 7.4% in Bulgaria to 15% in Estonia. **In Ukraine, 10.2% of disadvantaged students are high achievers in creative thinking.**

In PISA, academically resilient students are defined as the students in the bottom quarter of the PISA index of economic, social and cultural status (ESCS) in their own country/economy (i.e. disadvantaged students) who scored at the level of the top quarter in that country/economy (i.e. high achievers). These students are academically resilient because, despite their socio-economic disadvantage, they have attained educational excellence compared to other students in their own country.



Student Performance Differences Related to School Location

In most countries and economies, students from rural areas tend to perform poorer than students in cities with a population of more than 100,000. However, this difference is only significant in some cases. Among the reference countries, this difference is the largest in the Slovak Republic, Moldova, and Bulgaria (10 points) and the smallest in Estonia (3 points). **In Ukraine, students from rural areas lag behind their peers in cities with a population of over 100,000 by 6 points.**



The gap in success in creative thinking between urban and rural students is not directly related to differences in the quality indicators of schools and the educational services they provide. First of all, this gap reflects the relationship between the level of formation of creative thinking skills and such indicators as students' and schools' socio-economic status, which are probably determined by the place of residence. That is, schools located in rural areas have both socio-economically disadvantaged students and poorer creative thinking performance compared to those schools located in large cities (Fig. 14).

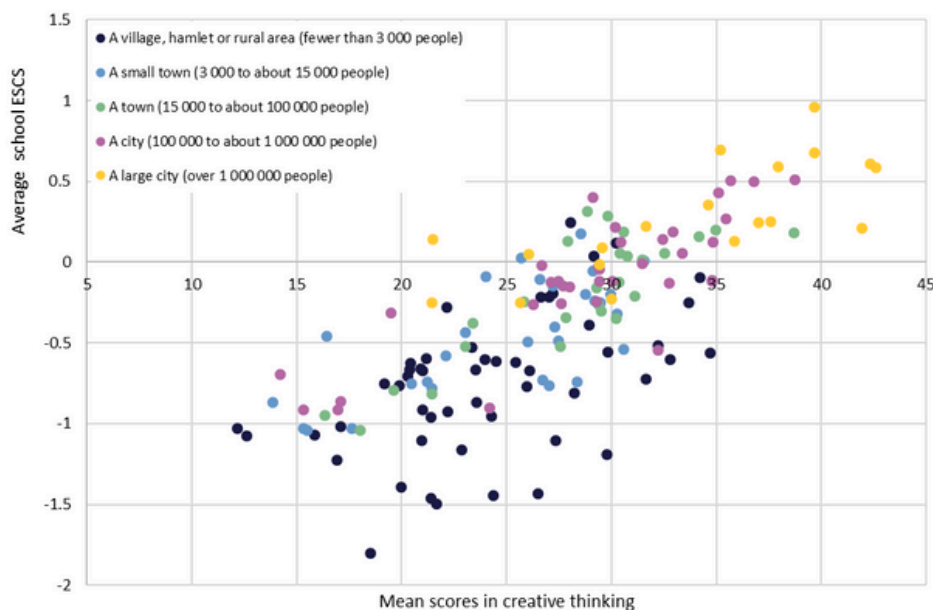


Figure 14. Relationship between the average level of formation of creative thinking in schools related to students' socio-economic status and school location

Source: OECD, PISA 2022 Database

After accounting for gender and socio-economic status of students and schools, the difference in creative thinking performance scores between students in cities and towns (100,000 or more people) and students in villages and hamlets (fewer than 3,000 people) becomes almost negligible in about half of the countries participating in the PISA-2022 assessment. In Ukraine, the difference even slightly favours rural students by 1 point.

Performance Differences by Educational Track

In Ukraine, students attending regular secondary schools, colleges, and vocational schools mostly performed poorer in creative thinking. They had a lower socio-economic status than those studying at lyceums, gymnasiums and specialised schools.

According to the PISA data, students of Ukraine's colleges, technical colleges, vocational and technical schools scored 5 points lower in creative thinking assessment than their peers enrolled in secondary comprehensive schools and educational complexes. The latter, in turn, are significantly though slightly less - by almost 2 score points - behind students attending lyceums, gymnasiums and specialised schools.

In lyceums, gymnasiums, and specialised schools, the share of students who achieved Level 3 and higher is very close to the corresponding share of students in secondary comprehensive schools and educational complexes (more than 60%). The share of such students in colleges, technical colleges, vocational and technical schools is about 40% (Fig. 15).

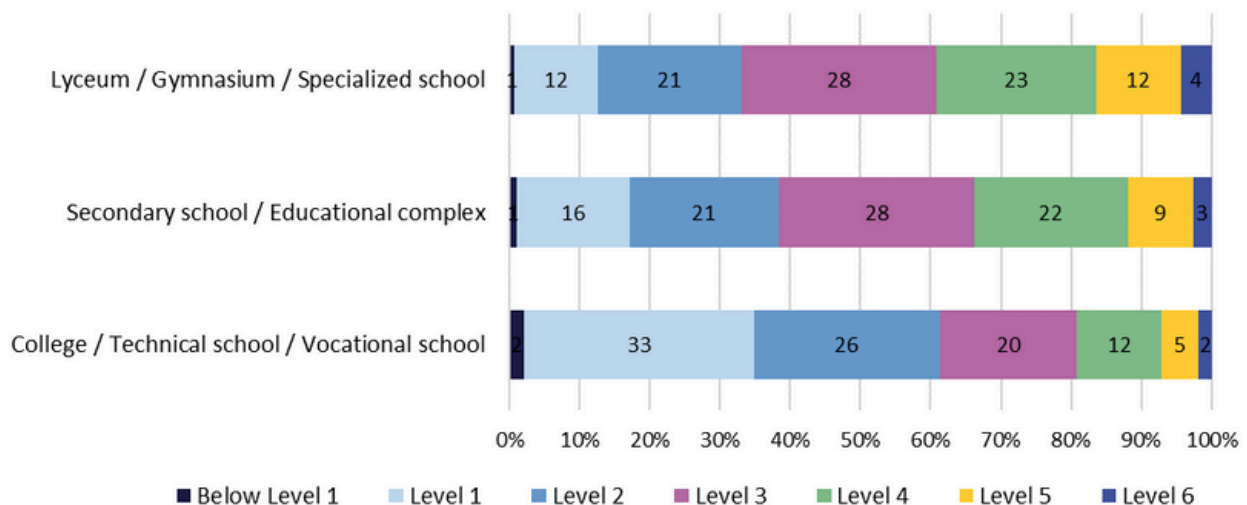


Figure 15: Distribution of Ukrainian students based on their level of creative thinking competence, by school type.

Source: OECD, PISA 2022 Database

5

STUDENT'S BELIEFS AND ATTITUDES TOWARDS CREATIVE THINKING



Students' Beliefs about the Nature of Creativity

Students who believe it is possible to be creative in almost any subject demonstrate a higher level of creative thinking than their peers who do not have such positive beliefs about creativity. On average, across OECD countries, students who agreed or strongly agreed with the corresponding statement scored over 3 points higher in creative thinking than those who disagreed or strongly disagreed, after accounting for students' gender and students' and schools' socio-economic profile. This represents a significant difference in performance between students who do and do not hold positive beliefs about the nature of creativity (about one-third of the OECD standard deviation in performance). In Ukraine, this difference exceeded 5 points (Fig. 16). Across all reference countries, similar and also significant performance difference was observed between the students who believe creativity can be expressed outside of an artistic context and the students who do not believe so.

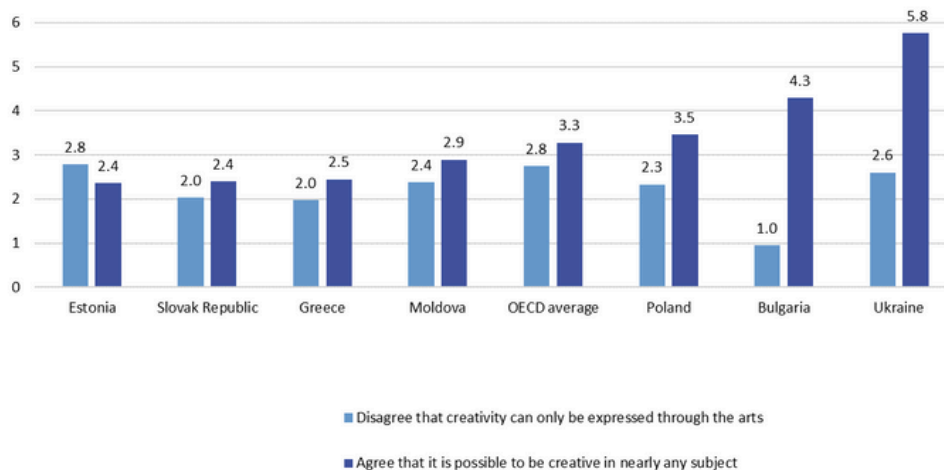


Figure 16. Score point difference between students who believe that it is possible to be creative in nearly any subject

Note: Odds are derived from logistic regressions for each student category separately. Students who passed the baseline threshold received 23 or more points in creative thinking.

Source: OECD, PISA 2022 Database

Students' Attitudes towards Creative Thinking

Four types of attitudes commonly support or contribute to an individual's capacity to engage in a creative thinking process. They are creative self-efficacy, openness to intellect, openness to art and experience, and imagination and adventurousness.

Creative Self-Efficacy

Creative self-efficacy describes an individual's confidence in their capacity to successfully engage in creative thinking activity and the ability to solve complex tasks related to it. Most students showed a high level of confidence in their ability to demonstrate creative thinking in everyday situations, for instance, if prompted to come up with many good ideas for helping people in need (71% on average across OECD countries) or ideas for solving disagreements between people (70%).

Creative self-efficacy describes an individual's confidence in their capacity to successfully engage in creative thinking activity and the ability to solve complex tasks related to it. Most students showed a high level of confidence in their ability to demonstrate creative thinking in everyday situations, for instance, if prompted to come up with many good ideas for helping people in need (71% on average across OECD countries) or ideas for solving disagreements between people (70%).

In their capacity to engage in creative thinking processes, students in Ukraine are less confident than on average the students across OECD countries. Girls reported a higher level of confidence in their creativity (except for the Slovak Republic). Students with a high socio-economic status show significantly more confidence in their creative thinking abilities and their capacity to tackle complex tasks compared to their peers from lower socio-economic backgrounds (Fig. 17).

Questions for Constructing the Index of Creative Self-Efficacy

How confident do you feel about having to do the following?

- Come up with creative ideas for school projects
- Show creativity
- Tell creative stories
- Demonstrate creative thinking
- Draw creatively
- Come up with many interesting ideas for scientific experiments
- Invent new things
- Come up with lots of ways to solve disagreements with people
- Deal with the problems of society, for example, the problem of environmental pollution

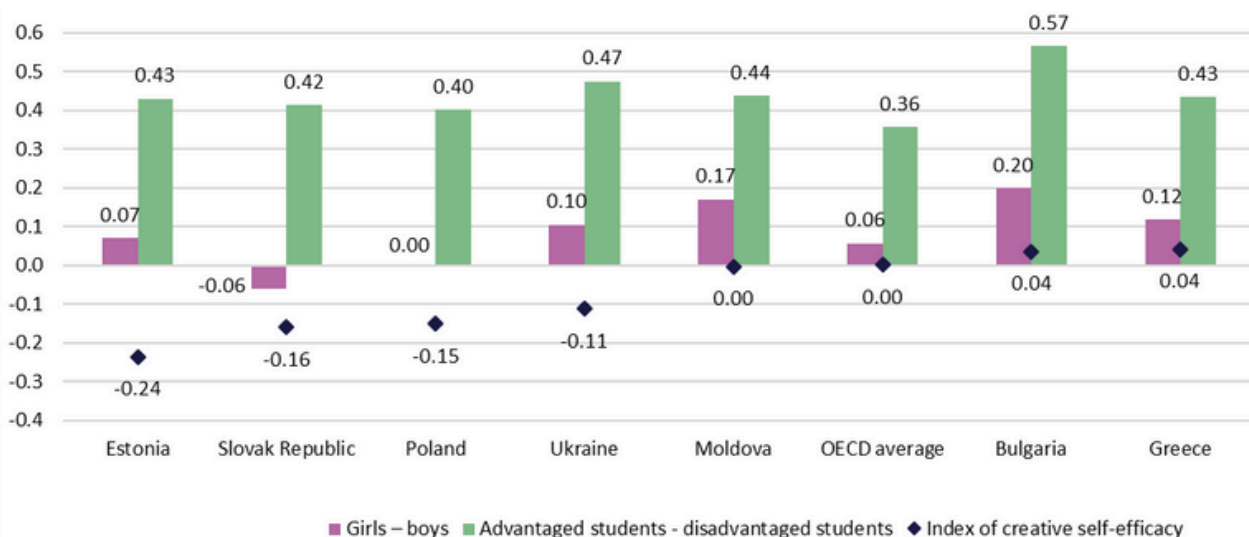


Figure 17. Values of the index of creative self-efficacy across reference countries, by gender and students' socio-economic status

Source: OECD, PISA 2022 Database

Openness to Intellect

Openness to intellect describes an individual’s receptivity to appreciate and engage with abstract and complex information. Across OECD countries, most students reported that they enjoy learning new things, they like doing something creative, or playing a game that challenges their creativity. Fewer students, though still a majority in most countries and economies, said they are open to intellect when faced with tasks that require innovative or creative solutions. The least number of students in most reference countries and, on average, across OECD countries liked to solve complex tasks or tasks that pose a certain challenge to them. In Ukraine, from 50% to 80% of teenagers agreed or completely agreed with all corresponding statements.

Questions for Constructing the Index of Openness to Intellect

To what extent do you agree or disagree with the following statements?

- Doing something creative satisfies me.
- I am very creative.
- I like creating stories.
- I like games that challenge my creativity.
- I enjoy projects that require creative solutions.
- I enjoy thinking about new ways to solve problems.
- I enjoy solving complex problems
- I like schoolwork that is challenging.
- I can suggest several solutions to problems.
- I enjoy learning new things.

In Ukraine, the index of openness to intellect is slightly higher than the OECD average. Openness to intellect is weakly related to gender but it is strongly associated with students’ socio-economic status (Fig. 18). In all countries, advantaged students are more open to the intellect (e.g. enjoying challenges in the form of complex tasks and projects or enjoying to learn something new, etc.) than their disadvantaged peers.

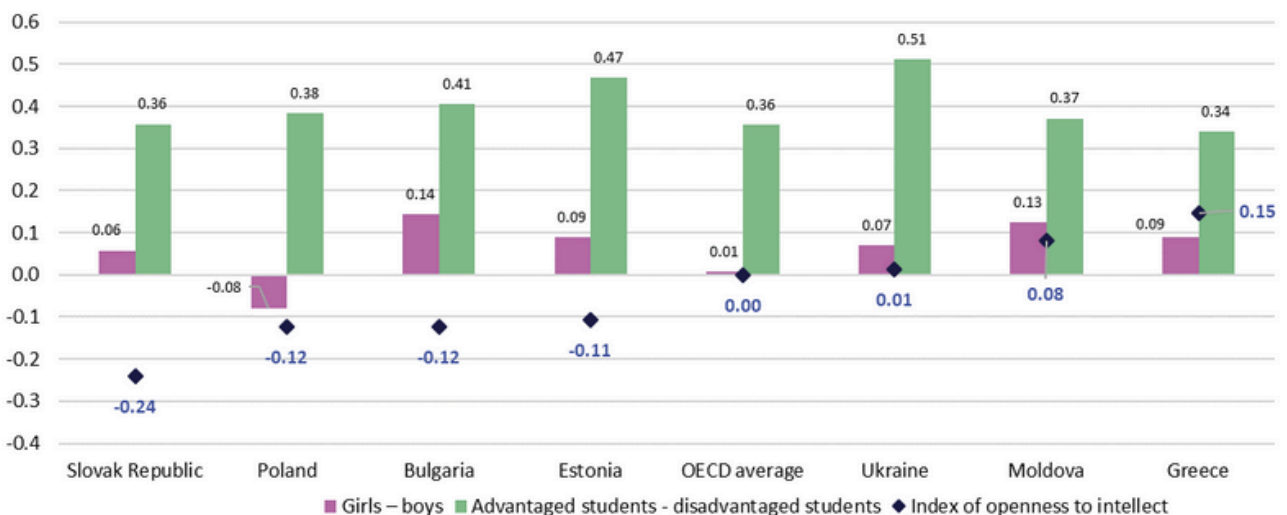


Figure 18. Values of the index of openness to intellect across reference countries, by gender and students’ socio-economic status

Source: OECD, PISA 2022 Database

Openness to Art and Experience

Openness to art and experience describes an individual's receptivity to engage with novel ideas, imagination, fantasy, aesthetics and emotions, and predicts creative achievement in the arts.

In all reference countries, except for Poland, the value of the index of openness to art and experience is higher than the OECD average (Fig. 19). Openness to art and experience is a very gendered attitude across all countries and economies compared to openness to intellect. This difference is even more significant than the difference determined by students' socio-economic status. Girls enjoy expressing themselves through art, see beauty in everyday things, and enjoy art activities more than boys. The differences determined by gender and socio-economic status are similar in Ukraine.

Questions for Constructing the Index of Openness to Art and Experience

To what extent do you agree or disagree with the following statements?

- I enjoy creating art.
- I enjoy artistic activities.
- I express myself through art.
- I reflect on movies I watch.
- I see beauty in everyday things.

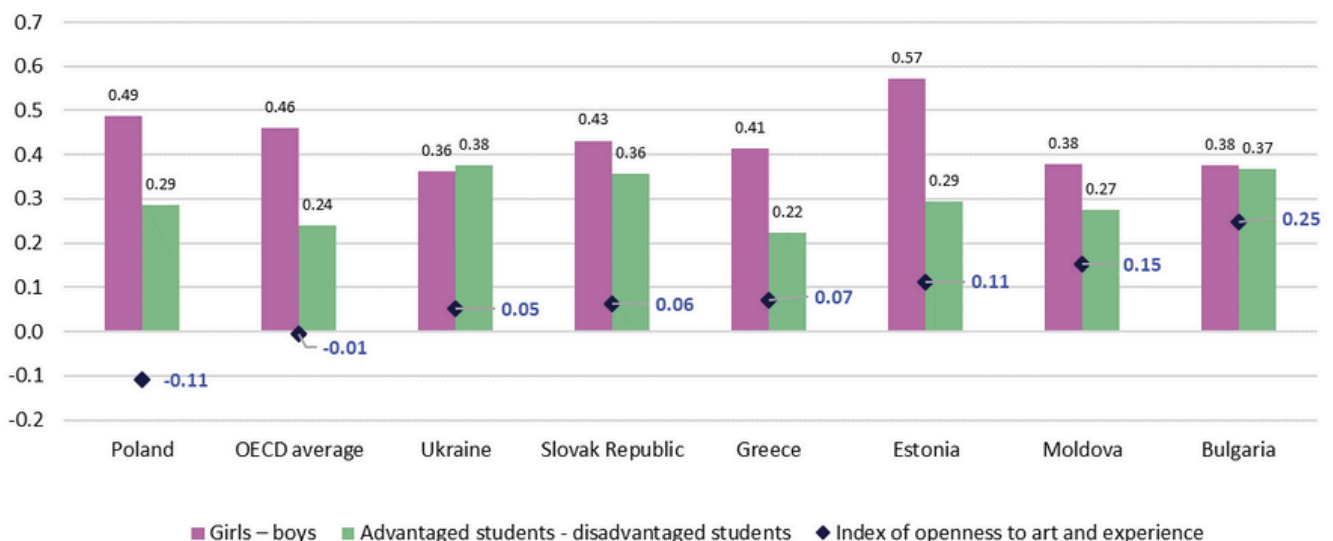


Figure 19. Values of the index of openness to art and experience across reference countries, by gender and students' socio-economic status

Source: OECD, PISA 2022 Database

Imagination and Adventurousness

Openness to art and experience describes an individual's receptivity to engage with novel ideas, imagination, fantasy, aesthetics and emotions, and predicts creative achievement in the arts.

The PISA index of imagination and adventurousness is associated with a divergent thinking component in the process of creative thinking. Convergent thinking helps in understanding problems and evaluating good ideas, while divergent thinking involves generating original ideas, establishing flexible connections between information, and demonstrating fluency in making associations and using imagination. Divergent thinking also includes the ability to explore new approaches, consider problems from different perspectives, and discover innovative ways of approaching tasks.

In Ukraine, students rate their imagination and adventurousness somewhat lower than on average the students in OECD countries do. Girls reported higher levels of imagination and adventurousness than boys, as did advantaged students compared to their disadvantaged peers (Fig. 20).

Questions for Constructing the Index of Imagination and Adventurousness

To what extent do you agree or disagree with the following statements?

- I have difficulty using my imagination.
- I often get lost in thoughts.
- Coming up with new ideas is satisfying to me.
- I have a good imagination.
- I would get bored doing the same thing every day.
- I like to be spontaneous.
- I would like to travel to places I have never been to.

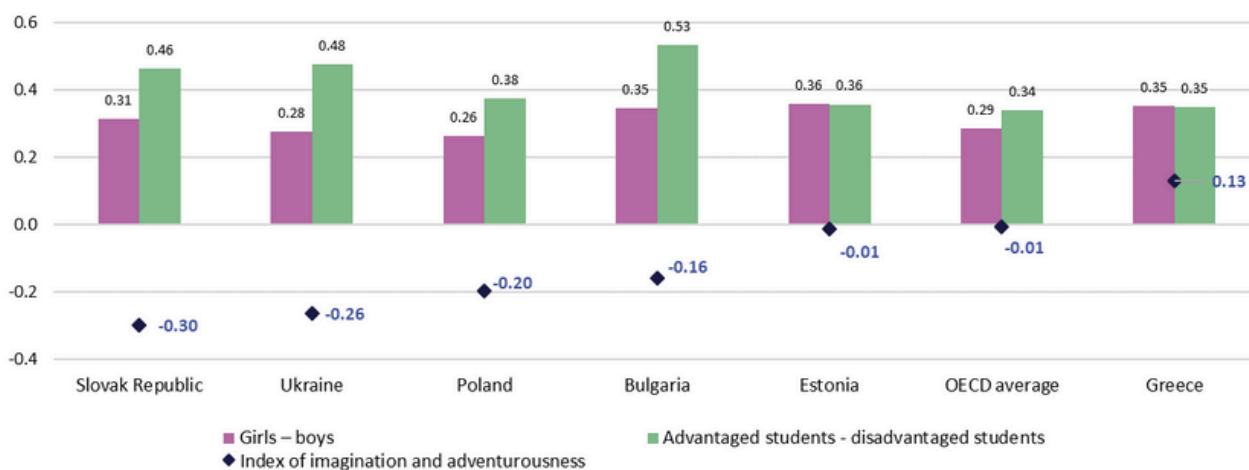


Figure 20. Values of the index of imagination and adventurousness across reference countries, by gender and students' socio-economic status

Source: OECD, PISA 2022 Database

All the indices that represent an individual's internal resources supporting creativity positively correlate with students' performance in creative thinking. In Ukraine, the correlation is the strongest with the index of openness to intellect – an increase of one unit in this index leads to a 2-point increase in performance. The other three indices have a similar impact.



SCHOOL
ENVIRONMENT
AND CREATIVE
THINKING

Teachers' Beliefs about the Nature of Creativity

In a lot of countries/economies, the majority of students attend schools the principals of which reported that creativity is a skill that can be trained (on average, 90% across OECD countries). Still, this figure is almost double of the proportion of 15-year-olds who believe they can change their creativity (on average, 47% across OECD countries) (Fig. 21).

While school principals more often believe (and it is more socially desirable) that creativity can be trained than their students believe that their own creativity can be improved, the gap between what learners and those in charge of their learning think is significant. The results of PISA 2022 show that students who are determined to develop their creativity and believe in it, usually, outscore their peers who think otherwise. Therefore, an essential first step in creating an educational environment that promotes the development of creative thinking is for teachers to convey their positive beliefs about the possibility of developing creativity to their students.

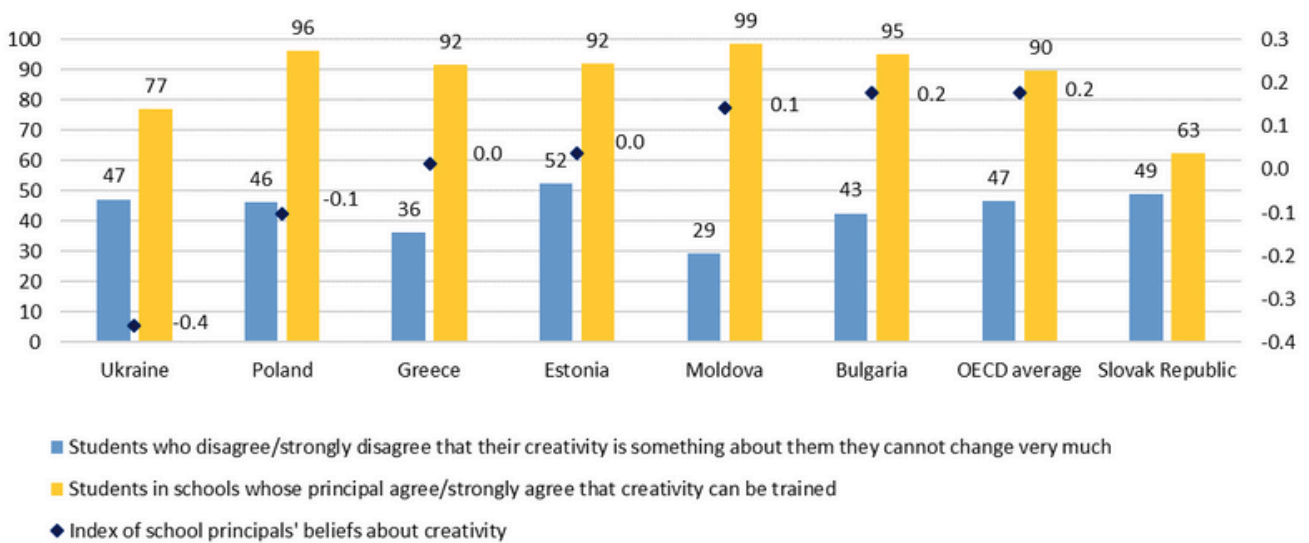


Figure 21. Percentage of students in schools whose principals believe that "Creativity can be trained" and percentage of students with a growth mindset towards their creativity

Source: OECD, PISA 2022 Database



School Openness to Intellect and Creativity

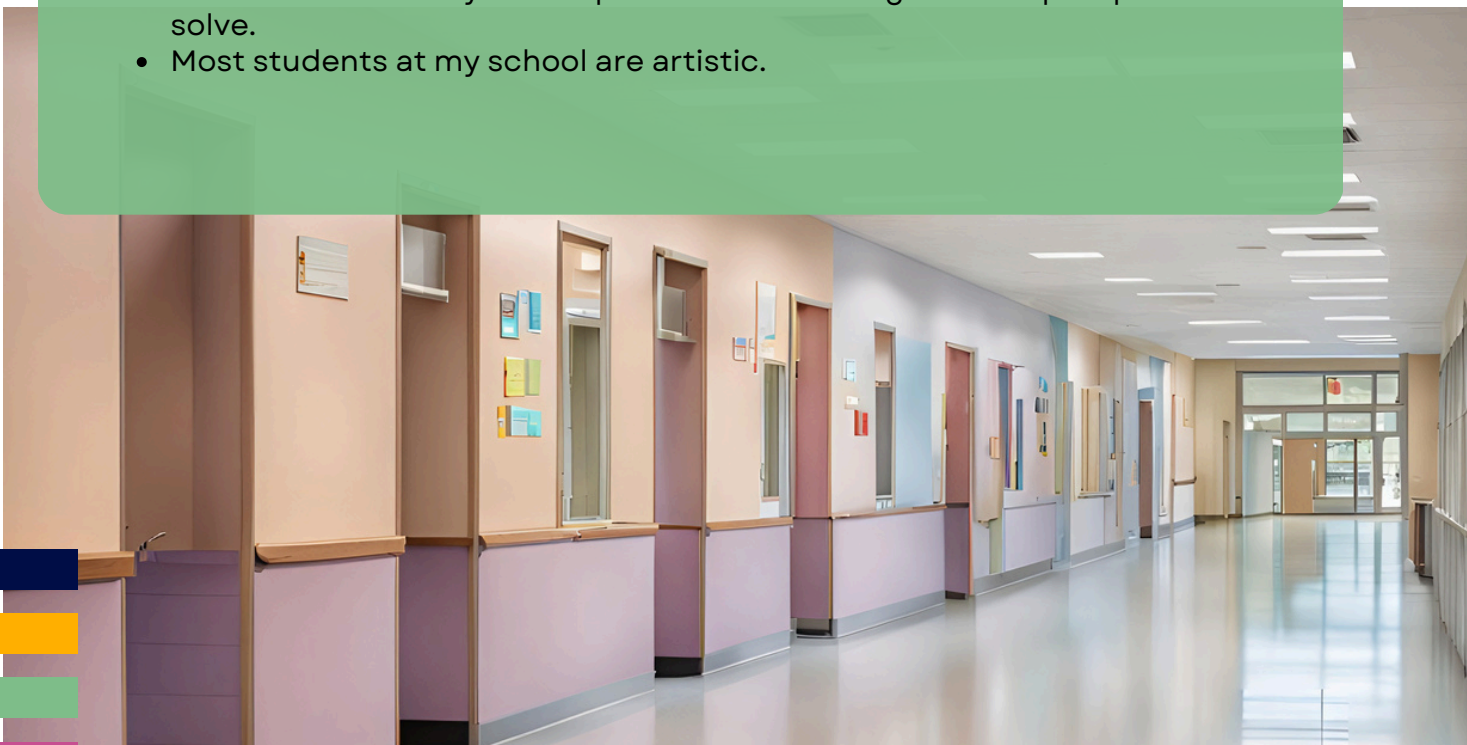
School principals mostly believe that students in their school are open to intellect and creativity. On average, about 75% of principals across OECD countries agreed or strongly agreed that most of their students are creative and imaginative and enjoy doing creative projects. However, less than half (46%) reported that most of their students are artistic. This suggests that many perceive artistic skills to be somewhat separate from broader creative or imaginative skills.

In Ukraine, heads of educational institutions reported the highest overall level of school openness to intellect and creativity among reference countries. In all reference countries, the principals of socio-economically advantaged schools reported a higher level of their students' openness to intellect and creativity than the principals of disadvantaged schools; however, in Ukraine and Moldova, the difference is not statistically significant (Fig.22).

Questions for Constructing the Index of School Openness to Intellect and Creativity

To what extent do you agree or disagree with the following statements?

- Most students at my school are creative.
- Most students at my school enjoy doing creative projects.
- Most students at my school perform well when given the freedom to be creative.
- Most students at my school enjoy work that is challenging.
- Most students at my school enjoy learning new things.
- Most students at my school perform well when given complex problems to solve.
- Most students at my school are artistic.



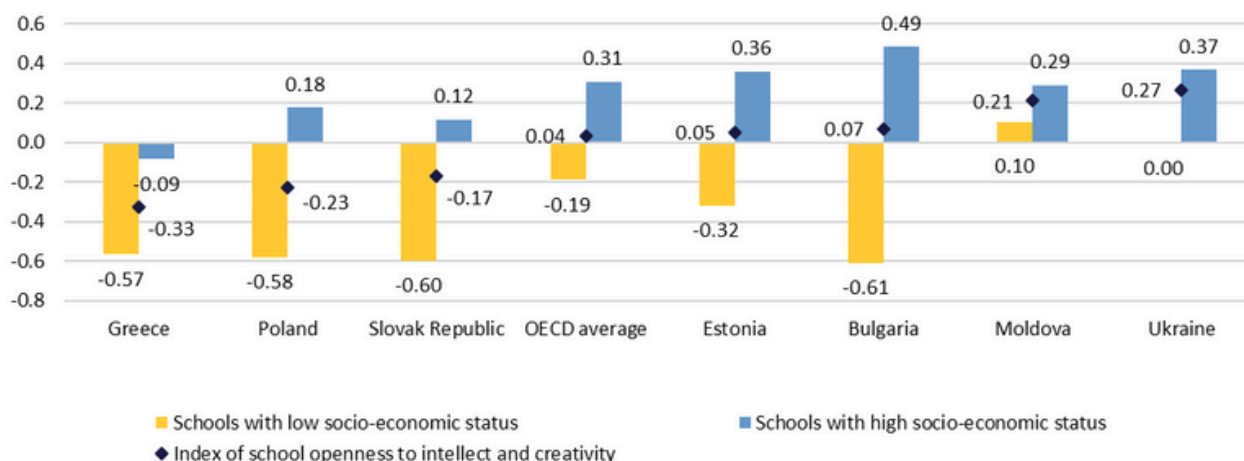


Figure 22. Values of the index of school openness to intellect and creativity across reference countries

Source: OECD, PISA 2022 Database

What school principals think of their students' openness to intellect and creativity is moderately correlated with students' creative thinking proficiency. A one-unit increase in the index of school openness to intellect and creativity was associated with a 0.3 score-point increase in students' creative thinking proficiency on average across OECD countries and a 0.2 score-point increase in Ukraine.

Teaching Practices Encouraging Creativity in Schools

Different educational approaches and practices can either encourage students' creative self-expression and high achievements in this area or hinder it.

Questions for Constructing the Index of Student Perception of Pedagogies Encouraging Creative Thinking

To what extent do you agree or disagree with the following statements?

- My teachers give me enough time to come up with creative solutions on assignments.
- My teachers value students' creativity.
- The activities we do in my classes help me think about new ways to solve problems.
- My mathematics assignments require me to come up with different solutions for a problem.
- My teachers encourage me to come up with original answers.
- At school, I am given a chance to express my ideas.

Many students across OECD countries believe that their teachers broadly value their creativity (70% of students on average across OECD countries) and give them a chance to express their ideas (69%). In Ukraine and Moldova, this indicator reaches almost 80%. Most students also reported that their teachers use specific teaching methods that are conducive to the development of creative thinking in the classroom.

Across OECD countries, socio-economically advantaged students tend to have a more positive perception of creative teaching methods compared to their disadvantaged peers. This difference is most noticeable in Ukraine compared to other countries. On average in the OECD and most reference countries, except for Bulgaria and Moldova, boys tend to have a significantly higher perception of creative teaching methods than girls. However, in Ukraine, girls have a slightly higher perception of creative teaching methods than boys (Fig. 23).

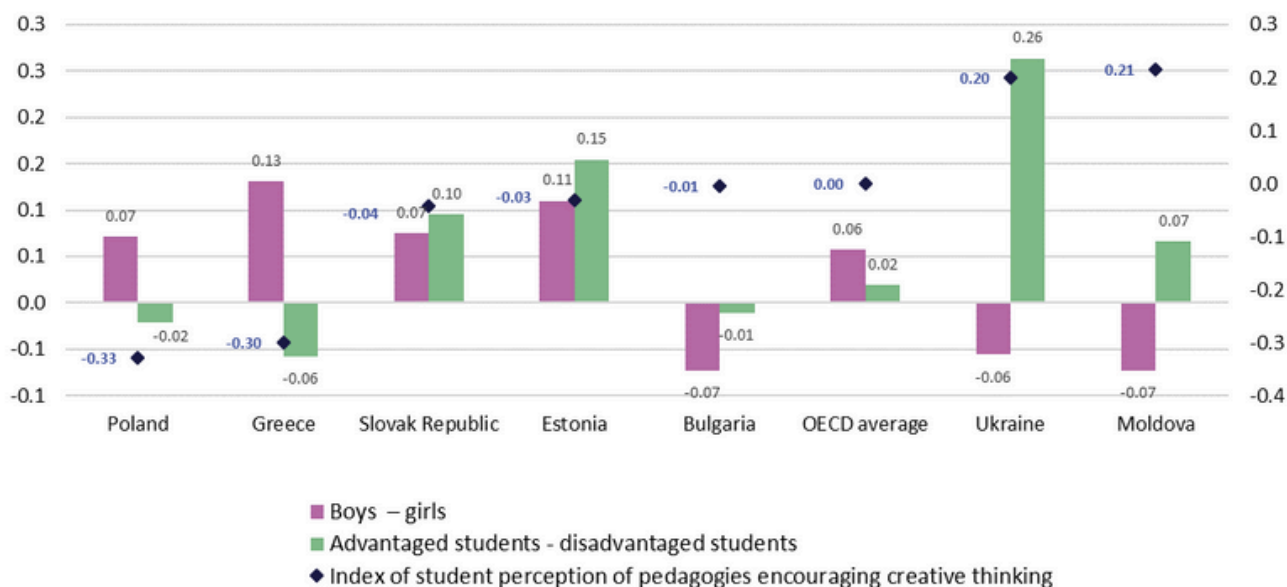


Figure 23. Values of the index of student perception of pedagogies encouraging creative thinking related to gender and students' socio-economic status

Source: OECD, PISA 2022 Database



As a rule, school principals and students tend to share the same views on their teachers' use of pedagogies encouraging creative thinking in their school. Among the reference countries, there are no schools where principals have a more critical view on that than their students.

On average, across OECD countries, the strongest positive association was found for students who believe that their teachers value creativity more broadly. These students scored 0.4 points higher than their peers, who reported that their teachers do not value their creativity. Students who reported that their teachers encourage them to come up with original answers (+0.2 points on average across OECD countries) or give enough time to find creative solutions when performing assignments (+0.2 points) scored an average higher than their peers. Those students who believe that the activities they do in their classes help them think about new ways to solve problems score 0.3 points higher than students who disagree with this. In Ukraine, all components of the index of student perception of pedagogies encouraging creative thinking are more positively related to students' achievements in creative thinking than on average across OECD countries (see Fig. 24).

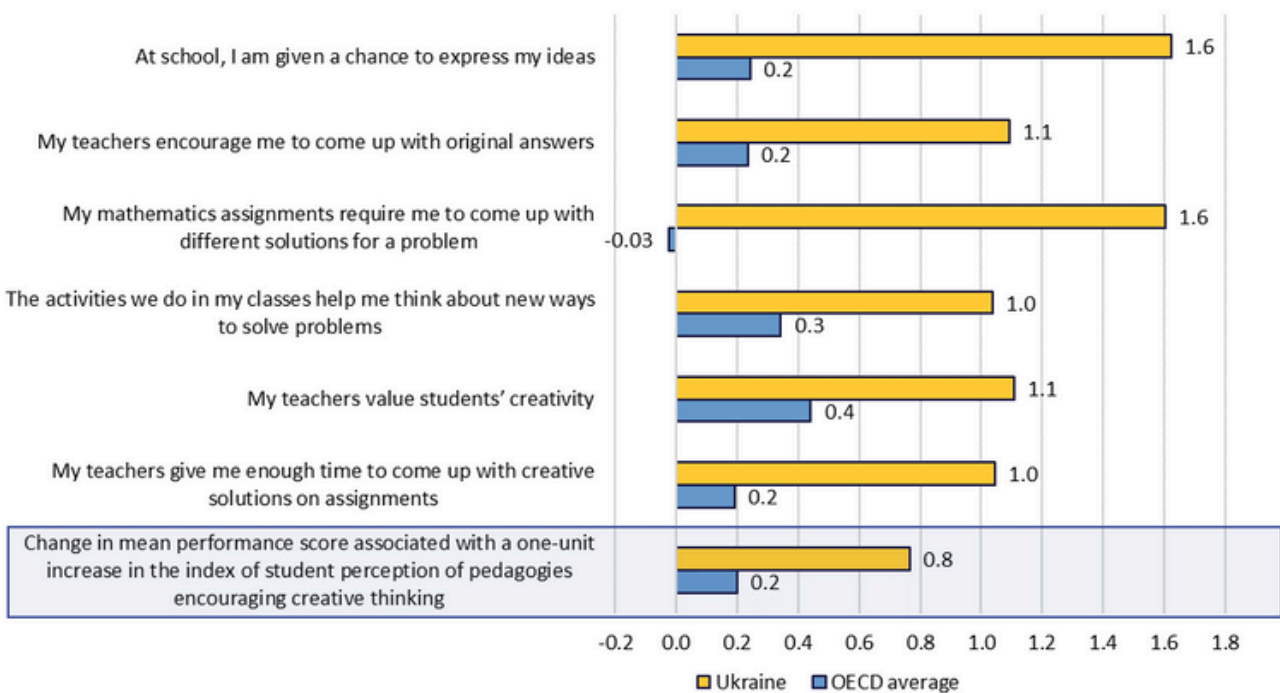


Figure 24. Relationship between creative thinking performance and the index of student perception of pedagogies encouraging creative thinking and its components (after accounting for gender and students' and schools' socio-economic status)

Source: OECD, PISA 2022 Database



Organising Creative Activities and Students' Engagement in Participating in Them Both at School and after School

Schools not only teach students core subjects like reading, math, and science but also offer opportunities for students to participate in activities that aim to broaden their experiences and support their holistic development.

In Ukraine, every fifth student attends classes or activities in fine arts, music, and creative writing at an educational institution at least once a week, and every fourth student attends classes or activities in computer science and programming. However, nearly 10% of students reported that none of these activities were available at their educational institution, and 17% of students emphasised the lack of school scientific clubs. Notably, Ukraine, Greece, Moldova, and Bulgaria have the largest number of students attending computer science and programming classes or activities at least once a week, both at and outside of school (extra-curricular activities).

Students normally participate in the activities that are provided more often. In Ukraine, up to 25% of students participate in school-based creative activities twice a week or more often.

On average, across OECD countries, boys tend to be slightly more involved in most types of school creative activities than girls, except for fine arts classes/activities. Around 30% of girls and 24% of boys participate in fine arts activities at least once a week. However, there are no significant differences in the participation of boys and girls in music classes/activities at least once a week (Fig. 25). In Ukraine, boys reported a higher level of involvement in all types of activities, although the difference was not significant for visual arts, creative writing, and music activities.

On average, across OECD countries, students from socio-economically disadvantaged families are more likely to participate in school-based creative activities than their more advantaged peers, despite the fact that advantaged schools might provide students with greater access to different activities at school (Fig. 25).



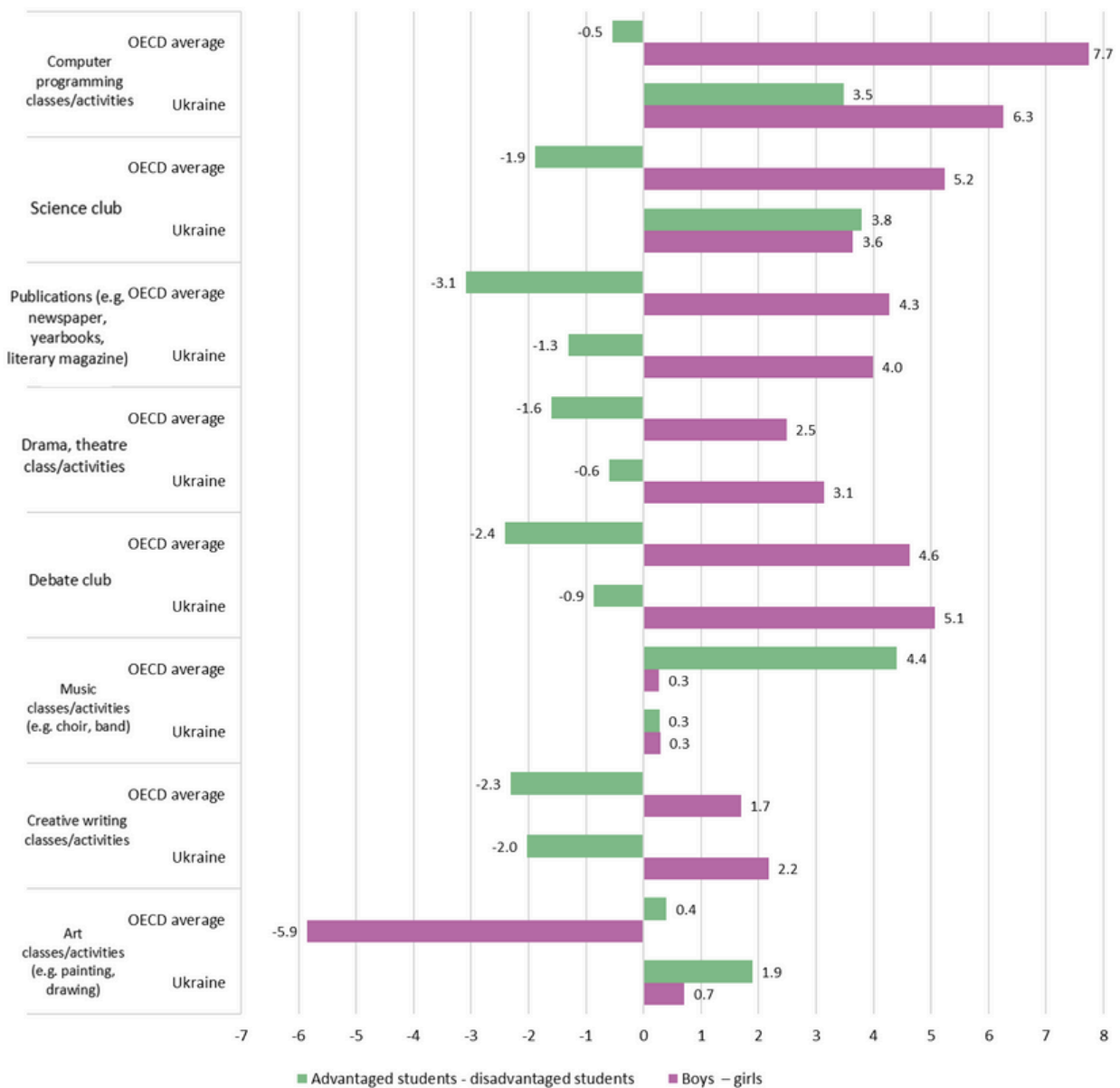


Figure 25. Variation of student participation in creative activities related to students' gender and socio-economic status

Source: OECD, PISA 2022 Database

On average, across OECD countries, students' participation in many creative activities at school is negatively associated with performance in creative thinking. However, after accounting for students' gender and students' and schools' socio-economic status, as well as students' mathematics and reading performance and their participation in creative activities at and outside of school, there is no significant association with the capacity to think creatively in all reference countries and on average in the OECD countries. In Ukraine, this relationship appeared to be negative.



Some interesting regularities are revealed when examining the average indicators of creative thinking associated with the frequency of participating in school-based creative activities. Thus, students who participate in creative activities about once or twice a week scored better on average than students who take part in those activities infrequently or on an ad-hoc basis (e.g. once a month or once or twice a year) as well as students who do so very often (e.g. every day or almost every day). The findings might suggest that creative activities that are consistently embedded in the curriculum and that involve students in tasks that require creative thinking on a regular basis (mostly within the framework of classes held once or twice a week in a secondary education institution) can help to develop students' skills better than an activity in which they participate infrequently or inconsistently. In Ukraine, we have a similar trend, especially when it comes to classes in fine arts, computer science/programming, and scientific clubs (Fig. 26).

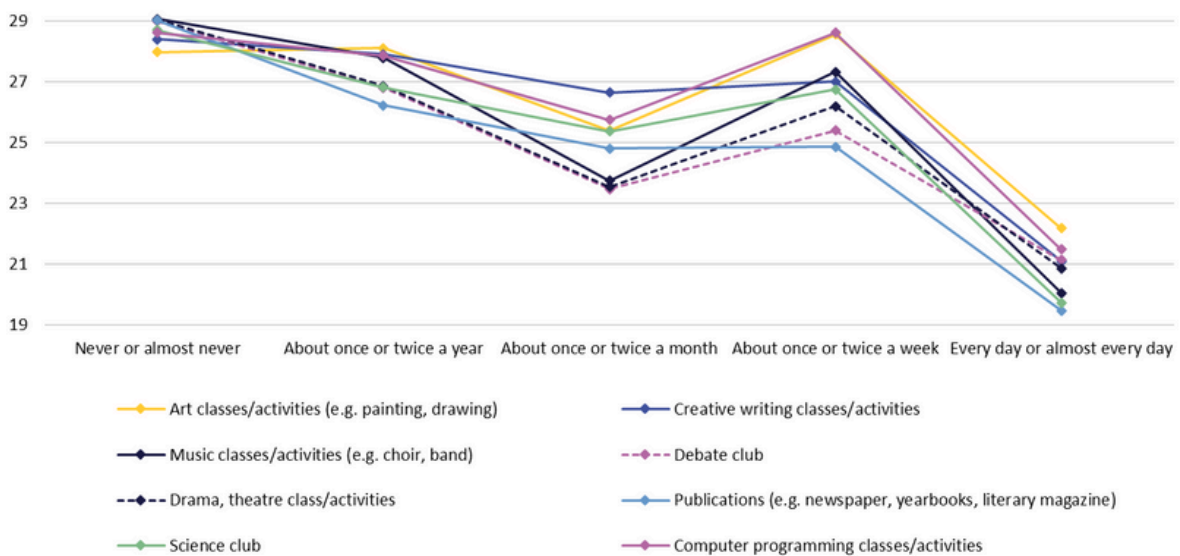


Figure 26. Student participation in activities at school and a mean score of creative thinking proficiency

Source: OECD, PISA 2022 Database

Ultimately, students' participation in creative classes and activities not only directly affects their success in creative thinking performance but also positively correlates with other student's attitudes that are conducive to developing creative thinking, such as creative self-efficacy and openness to intellect. An increase in the index of participation of students in school-based creative activities is significantly associated with an increase in each of these two indices in all reference countries. This positive relationship is preserved or strengthened after accounting for students' gender, students' and schools' socio-economic status, as well as students' performance in mathematics and reading (Fig. 27).



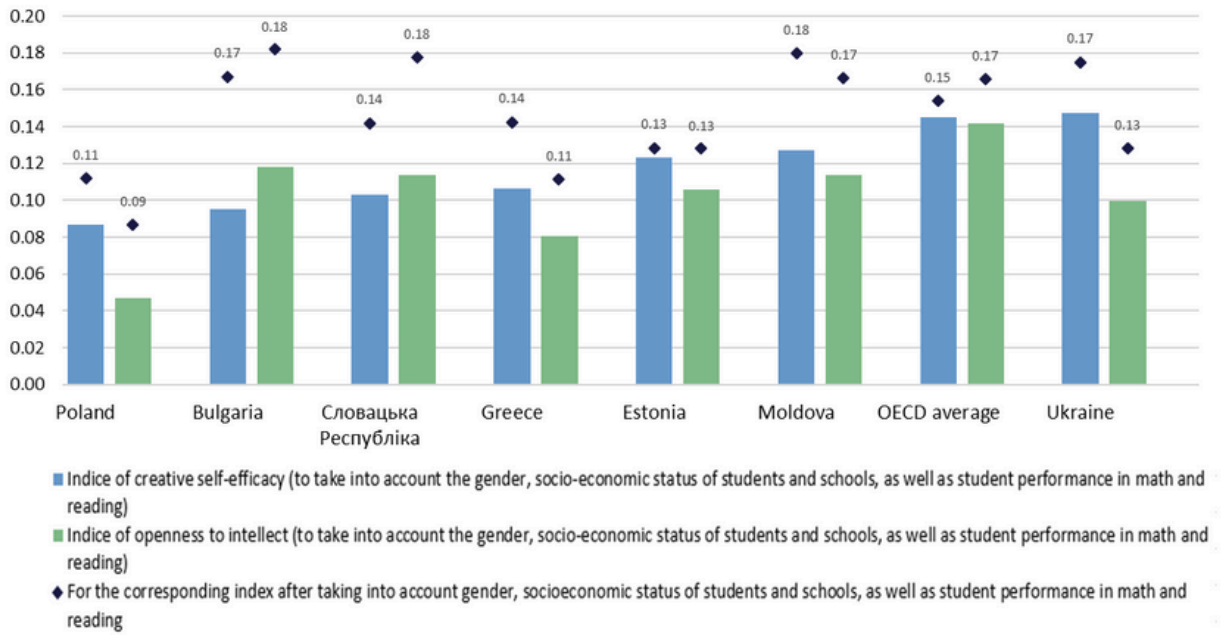


Figure 27. Change in indices of creative self-efficacy and openness to intellect, if the index of participation in creative activities at school increases by one unit

Source: OECD, PISA 2022 Database





МІНІСТЕРСТВО
ОСВІТИ І НАУКИ
УКРАЇНИ

PISA
UKRAINE



УКРАЇНСЬКИЙ
ЦЕНТР
ОЦІНЮВАННЯ
ЯКОСТІ ОСВІТИ



КРЕАТИВНЕ МИСЛЕННЯ

НАЦІОНАЛЬНИЙ ЗВІТ

за результатами
міжнародного
дослідження якості освіти

PISA-2022



**PISA 2022: Main Results of Ukrainian Students'
Creative Thinking Assessment. How creative are
Ukrainian 15-year-olds?**

Authors: Lisova, T. (main author), Tereshchenko, V. ,
Bychko H., Mazorchuk, M., Bondarenko H.,
Vakulenko, T.;

translated by Shumova K., Shpak, Yu.

Ukrainian Centre for Education Quality Assessment.
Kyiv, 2024. 42 p.